$750,000,000
TVRO FUNDING LAUNCHED!

COOP'S SATELLITE DIGEST

NOVEMBER 1983

TOP OF THE MONTH

SPACE battles back. On November 3-5 the **S**ociety for **P**rivate **A**nd **C**ommercial **E**arth stations meets in its second annual gathering; Orlando, Florida in and amongst the futuristic setting of the Walt Disney empire. The exhibit hall is a sell out, registrations in advance signal a significant turn out.

MANY will be coming to put their corporate hats into the ring with Satellite Financial Planning Corporation; the folks bringing $750 million in consumer financing into the industry starting November 8th. SFPC will trot out the giant fund with an invite-only reception Wednesday the 2nd at Orlando and make a general one hour presentation within the all-day seminar on Wednesday the 3rd.

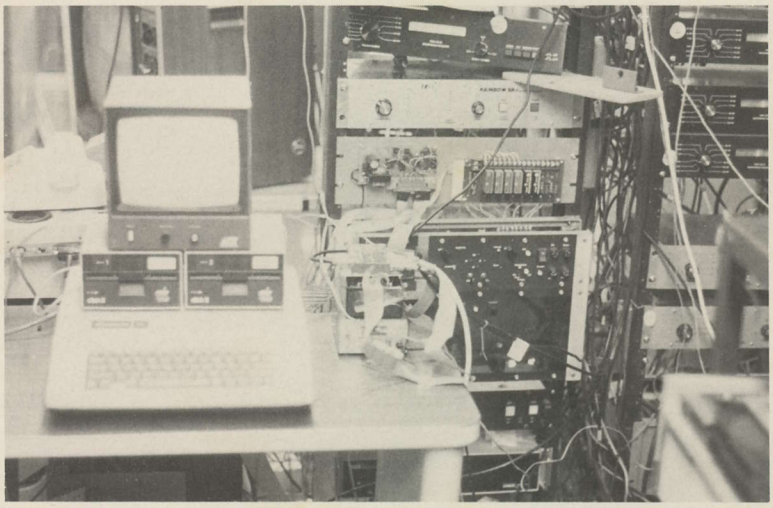
ANOTHER show that cast cold water on hopes for a European private terminal industry is reviewed here this month; CAST '83 in England turned out to be as gloomy and unappealing for private TVRO interests as the weather. See page **40.**

A VERY clever group of college students at Creighton University, Omaha, have married an Apple computer to a 12 foot satellite dish to 'track' the Russian Molniya satellite. The program, and how it works, starts on page **8.**

MEASURING a 'broken' antenna may not seem like a productive exercise; nor much fun. It helps us better understand why the good ones work better, as we explore starting on page **28.**

IF you will be in Orlando, stop by and see us!

NOVEMBER 1983



OUR COVER/ **Joseph Gammon,** President of the First National Bank of Wilmington (De) and **William Young,** Satellite Financial Planning Corporation (Baltimore, Md) consummate the funding arrangements which will pump $750,000,000 in consumer lending dollars into the (home) TVRO industry during the coming 14 months. The rush to educate dealers and consumers alike starts November 3rd in Orlando at the SPACE gathering; details on page **36** here.

COOP'S SATELLITE DIGEST

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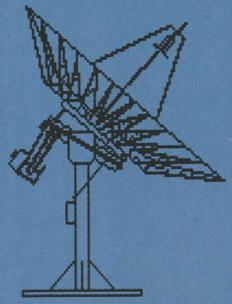

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COOP'S SATELLITE COMMENT

- **TRANSMITTING Through The Air**
- **LINKABIT SCRAMBLING Is Real**
- **COPYRIGHT Is Real Too**

LINKABIT Is Real

While my observations concerning the state of satellite TV in Europe are to be found elsewhere in this issue of **CSD** (see **"CAST '83: A Report"**), there was one display at the Birmingham, England show which really impressed me. It was the product of a United States firm; **M/A-COM Linkabit, Inc.** If the name sounds familiar, it should. That is the firm that won the contract from HBO to provide scrambled video and audio for the premium service feeds on F3R.

George W. Gilbert of M/A-COM was on hand to show off a 'satellite simulated' display of the Linkabit system and it was an outstanding demonstration. Because of the complexity of demonstrating a scrambled satellite signal in Europe where satellite transponders cannot be simply 'ordered up' with a telephone call, Linkabit had put together a first-rate video tape demonstration using 1 inch

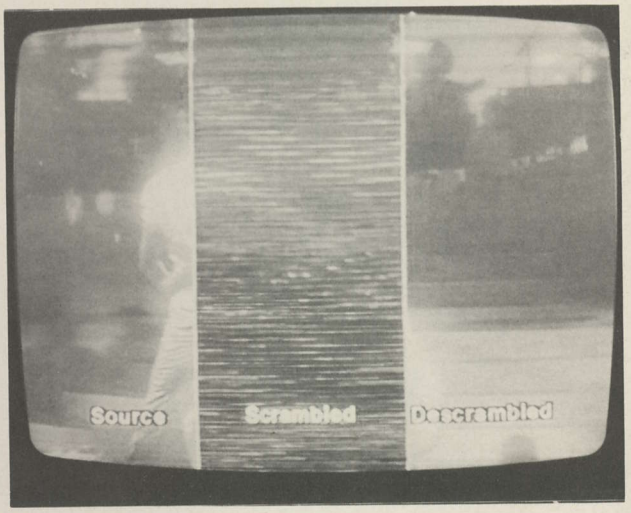
THE LOOK OF SCRAMBLING. No audio either.

tape. First the tape showed you the video program material (with audio) of the basic program; a popular singer doing an 'HBO-like' number. Then, using a split-split screen approach they showed you the same signal on the screen scrambled and descrambled. They also showed you the picture in its original unscrambled uplink format, the scrambled format, and then the descrambled downlinked format. The trick was for the viewer to look at the original unscrambled video on the far left, then the descrambled video on the far right of the screen, and determine whether there had been picture degradation in the process. The photos here show you what it looked like.

Point number one: When Linkabit scrambles the video, it is so thoroughly scrambled that you see nothing. None of this mickey-mouse video inversion and sync removal which you see on ANIK or Westar. The screen looks like an empty transponder; white and black streaks lay over and inside of everything. We judge that the average viewer would dial across a Linkabit scrambled signal and not even realize there was video on the transponder(!). More than impressive.

Point number two: The audio is gone. Totally. And well it should be since they turn it into a digital format signal and your TVRO receiver can't even spell digital. No sign of a carrier; no sign of anything.

Point number three: Unlike every other scrambling system we have previously seen, there is signal enhancement with Linkabit. Part of the display tape showed you on a split screen the reception of the program material using regular satellite transmission techniques, and then on the opposite side of the screen, the same signal having been scrambled and then descrambled by Linkabit. They started off with relatively stout signals; in the 14 dB CNR (carrier to noise) region. Then they backed down the split screen display to 4



LINKABIT/ original video on left, scrambled video in center and descrambled video on right of screen.

dB CNR. That's a signal level which you would not watch on a regular satellite circuit. As the photos here show, you not only could but you would still watch that signal on a Linkabit circuit. There is about a 2 dB (or more perhaps) 'enhancement' of the signal when it travels via Linkabit.

I quickly decided that what Peter Sutro and I were witnessing was a very dramatic and powerful argument why everyone sending video via satellite and fighting weak signal levels ought to jump onto the Linkabit system with both feet. Imagine being able to almost double the satellite's effective EIRP by simply switching to a Linkabit scrambled format. Mind boggling.

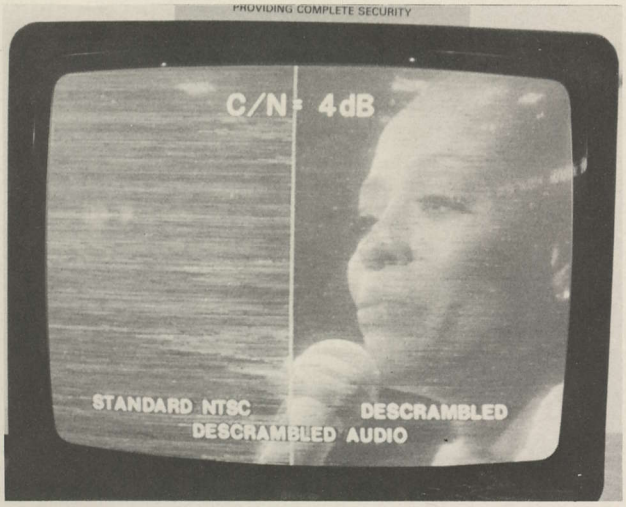
It took me about six seconds to realize that **everyone** in the home TVRO industry **should see this demonstration.** And while I have known George Gilbert for years, dating back to the start of the HBO satellite era, I cannot in all fairness say that we are friends. We have

TWO dB ENHANCEMENT. Measured carrier to noise ratio of 6 dB with normal satellite transmission on left, LINKABIT system on right. Notice streaking on left hand portion of screen.

never had the opportunity to spend sufficient time together to become friends. With some nervousness I asked George, "What would it take to bring this demonstration to the SPACE show in Orlando early in November?". We talked about it, and Peter Sutro jumped in with both feet to reinforce my suggestion. "No question, everyone in the TVRO industry needs to witness this display, first hand," Peter added. Well, it took some doing but after negotiations, M/A-COM Linkabit has agreed to be in Orlando to demonstrate and explain the Linkabit system. I think it will be one of the highlights of the Orlando show.

This is such a radical approach to scrambling, at least the format one sees on the screen (which in this case you don't see since there is virtually nothing there to see and certainly nothing to hear), that I have to commend HBO for holding out for **this** system over those offered by competitive would-be-scrambling-suppliers.

Those of us who have written about the HBO/Linkabit decision in the preceding months simply did not know what we were talking about. We suggested that the picture would be degraded, since **all** scrambling pictures are **always** degraded. If the tape display I saw in England was for real, quite the opposite is true. It gets better, not worse, with scrambling. We have suggested that some clever people will work out their own descrambler systems. Perhaps. But not soon.



4 dB CNR. Standard NTSC video is all but gone while LINKABIT system descrambled video on right is still very useful.

When HBO (and probably others) scramble with Linkabit, it will **really be** scrambled. And I suspect it will stay that way.

The only real unknown at this point is the ability of Linkabit to produce field units that go in working and stay working, full time. The success (or failure) of the Linkabit scrambling system will boil down to equipment reliability. The system obviously will work and do everything it planned to do. Probably far more. And no, I don't expect that we will see 'black market' Linkabit descramblers out there anytime soon.

FOOTBALL A NO-NO

Minutes before Susan and I were to board a British Airways 747 for London in September Bob Behar ran me down.

"You won't like this," Bob said. He was right.

It seems that Bob had just returned from a grueling several hours in a Miami Federal District Court where he had been called upon to testify about the nature and extent of the TVRO business we all know and love.

On trial were a trio of South Florida area bars or taverns. They had been caught using their TVROs to tune in locally blacked out **Dolphin** football games and the NFL and Dolphin owners were out for blood.

Last year, as many will recall, was an unusual year for pro football. The strike lasted too long, much of the season was lost, and thousands of fans in each city thought the players were at fault. When the games finally did return to the field, in an abbreviated season, the fans stayed home. Normally full stadiums were not full.

But the TV cameras ground on and on one Sunday in particular a Dolphin game being played in Miami was sent back to New York, via satellite, where CBS picked it up and added in the commercials and other pablum before sending the game back out to the affiliates. Only there was no affilaite carrying the game in South Florida since the game was not 'sold out.'

Under NFL rules, if a game is sold out a certain number of hours before kick-off, the local TV network affiliate may carry the game. If the stadium is filled anyhow, the NFL loses no money by televising the game locally. Actually it makes more money because of the expanded TV rights.

More than ten years ago, the folks who run the pubs and taverns in South Florida discovered that if they installed a quad-stack of high gain yagi antennas, or a seven foot parabolic dish, and pre-amped the signal to beat hell, they could get sort-of-reception from a station or two some 100 miles or more away. The black-out region (where the game can**not** be shown) extends out far enough from the stadium that the NFL does not feel television coverage will hurt the gate. There are hundreds, make that thousands, of bars and taverns with big fringe area UHF antenna systems in South Florida. **All for blacked-out Dolphins football.**

Then a couple of years ago somebody figured out that even when the Dolphins are blacked out locally, more often than not the games are televised by CBS elsewhere. And, that the games go from Miami to New York as a 'clean feed' (i.e. without commercials) on satellite. Usually on Westar 4, I have noticed.

So along comes a guy offering a TVRO to a bar or tavern. Someplace in there it comes out that first rate, projection-TV-quality reception of the blacked out games is possible on satellite. Ring up a sale for the TVRO seller.

The NFL and Dolphins, as noted, had three such bars in court that Wednesday. They had initially caught seven bars doing the same thing, back late in the 1982 season. Four of the seven admitted they did this and were let off with some unknown minor fine. They probably also promised never to do it again. But the other three were stubborn. And they ended up in Federal District Court before **Judge James W. Kehoe.** The trio of bars were charged with various offenses including violation of the COPYRIGHT of the game and for violating various sections and sub-sections of Section 605. This was a double edged sword. First they (NFL/Dolphins) contended that the game in its 'clean feed form' was not yet the property of CBS; that the rights to the property (i.e. copyright) still belonged to the Dolphins and NFL. They asked Judge Kehoe to grant them an immediate injunction telling the trio of bars (plus any others in South Florida) to cease and desist that practice of taking 'clean' Dolphin games off of the satellite. **The Judge agreed and granted the order.**

COOP continues/ page 84

Satellite Financial Planning brings Bank Rate Financing on home TVRO systems.

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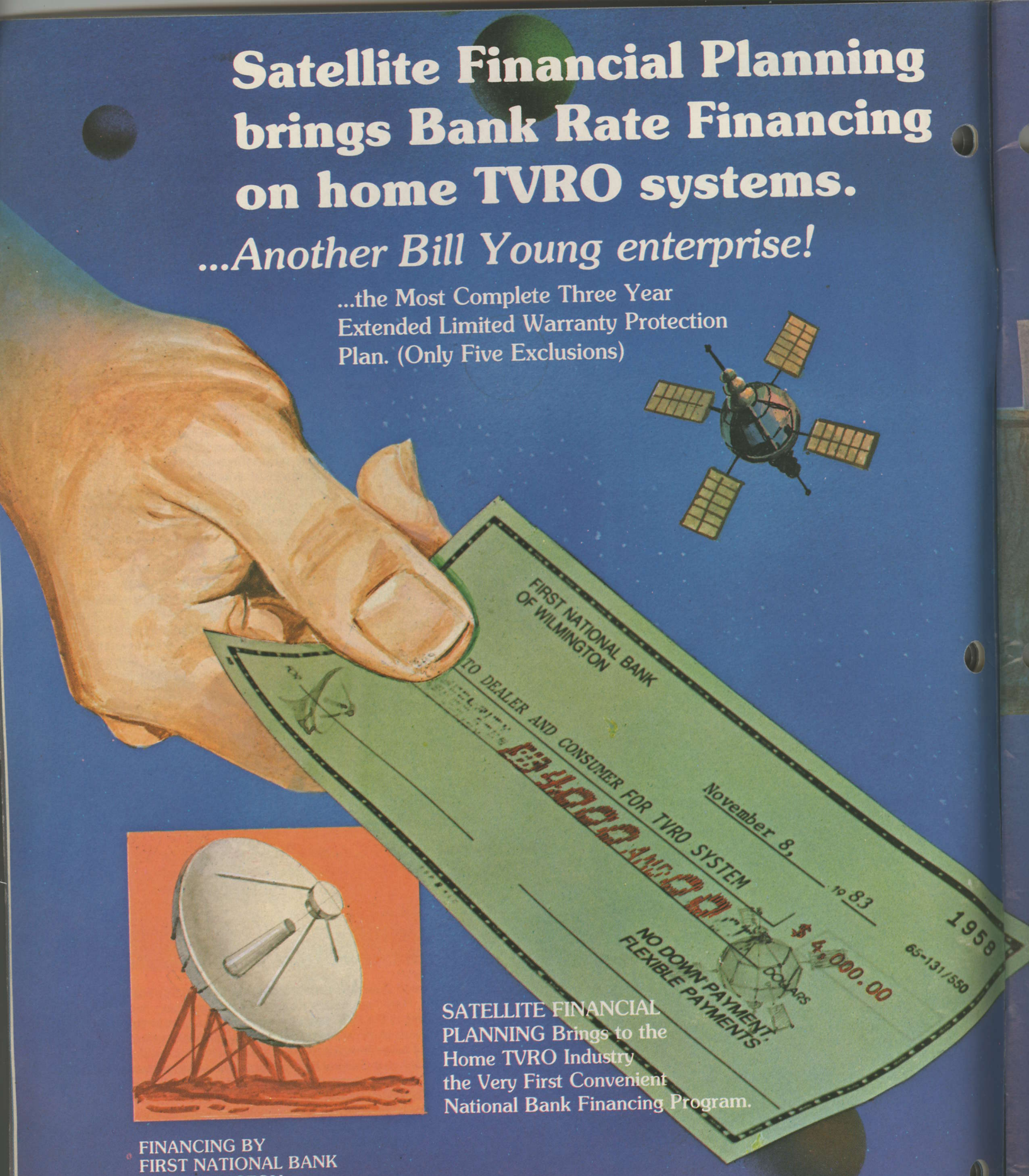

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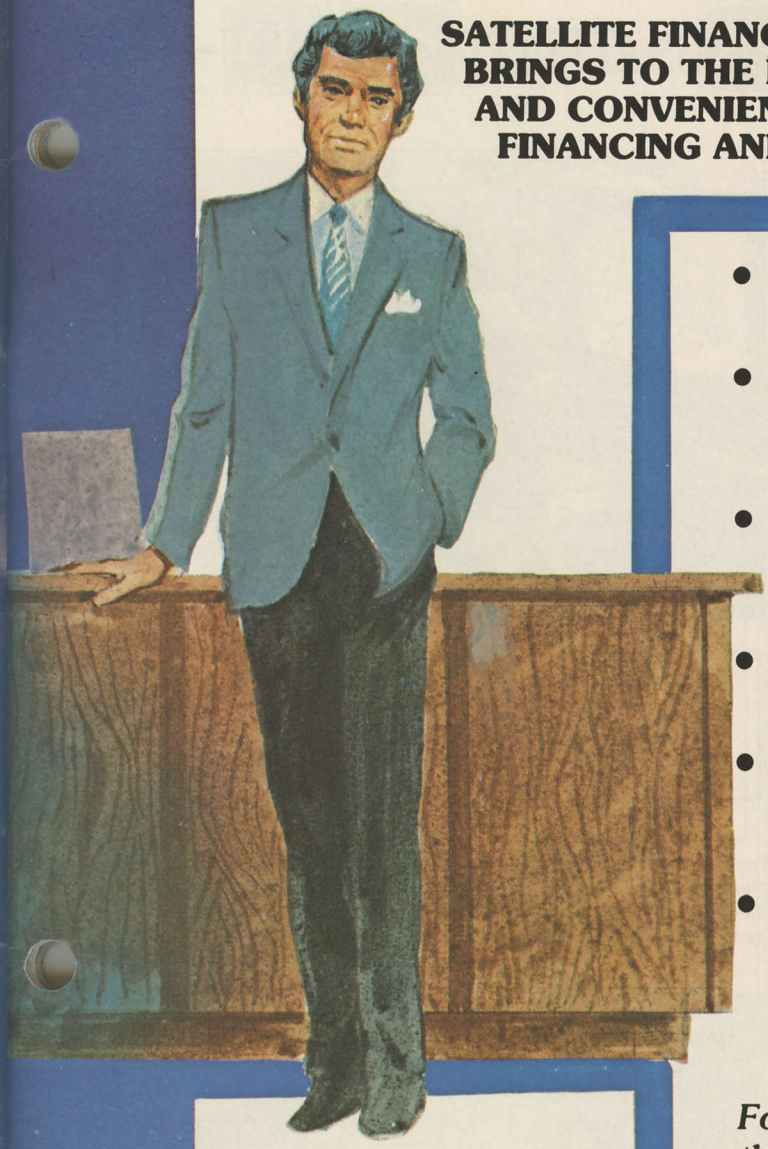

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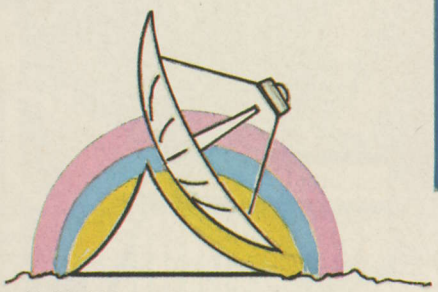
*RATE AS OF OCTOBER 5, 1983.



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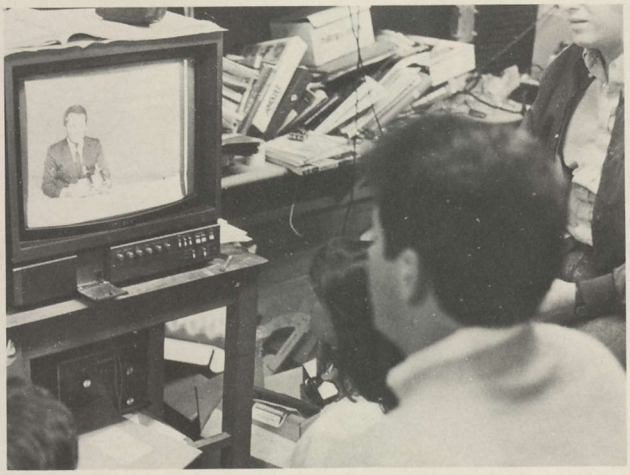
Address _____

State _____ Zip Code _____

APPLE COMPUTER TRACKING OF RUSSIAN MOLNIYA SATELLITES



Note: This article deals only with the computer tracking of Molniya. The earlier steps of locating the satellite, installing Right-Hand Circular polarization, and getting the audio out of the video signal have been covered in **CSD** on previous occasions, as well as in two manuals offered by **STTI.**

Thanks to some elegant home-brewed engineering, Creighton University has live Russian television 24 hours daily on its channel 10 campus cable system dial. This report details how the drudgery of constant aiming and re-aiming of the satellite antenna has been eliminated by connecting the antenna system to an **Apple** computer.

Since the Molniya family of satellites operate in an elliptical orbit, they have to be tracked continuously; definitely a job for a computer. Our system has proven itself as simple to implement, low in cost, efficient and dependable. The heart of the system is an Apple IIe computer.

Preliminaries

For the computer to do a good tracking job, the first requirement is a solid, smooth-operating antenna mount. We began by modifying a polar mount of a Paraclipse 12 foot antenna for azimuth-elevation operation.

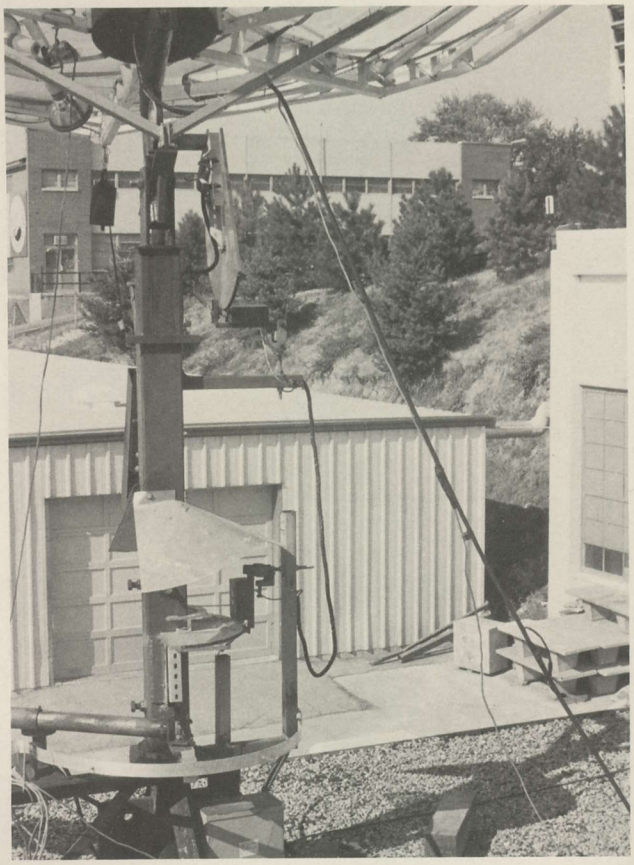
It is also important to do a lot of manual (hand) tracking of the Molniyas from your longitude/latitude so that you can design sufficient tracking range into your antenna mount. When we had done this and were sure of the ranges required, we strengthened the mount as necessary to achieve smooth, close tolerances for the antenna position.

The computer has to be able to 'sense' the position of the antenna very precisely; of all possible methods, we elected to have the antenna drive a gear which in turn drives a ten-turn potentiometer; one for azimuth and another for elevation. This has proven to be precise enough for satisfactory Apple tracking.

At Omaha, Nebraska (location 41.14° latitude; 96.01° longitude) the four Molniya satellites making up a full day's "service string" track from about 2° east to 52° east (azimuth) and from 54 to 80 degrees in elevation. Since the orbits do change to some extent and since Russia does replace existing Molniya birds with totally **known** orbits with new Molniyas with **unknown** orbits, the position sensor must have some tolerances. For example, let us allow our ten-turn potentiometers to have a maximum turn of 8 turns. Now if we design for a 100 degree antenna movement in any one plane, and if the gear on the potentiometer has a radius of 0.5 inches, then the gear radius is calculated as follows:

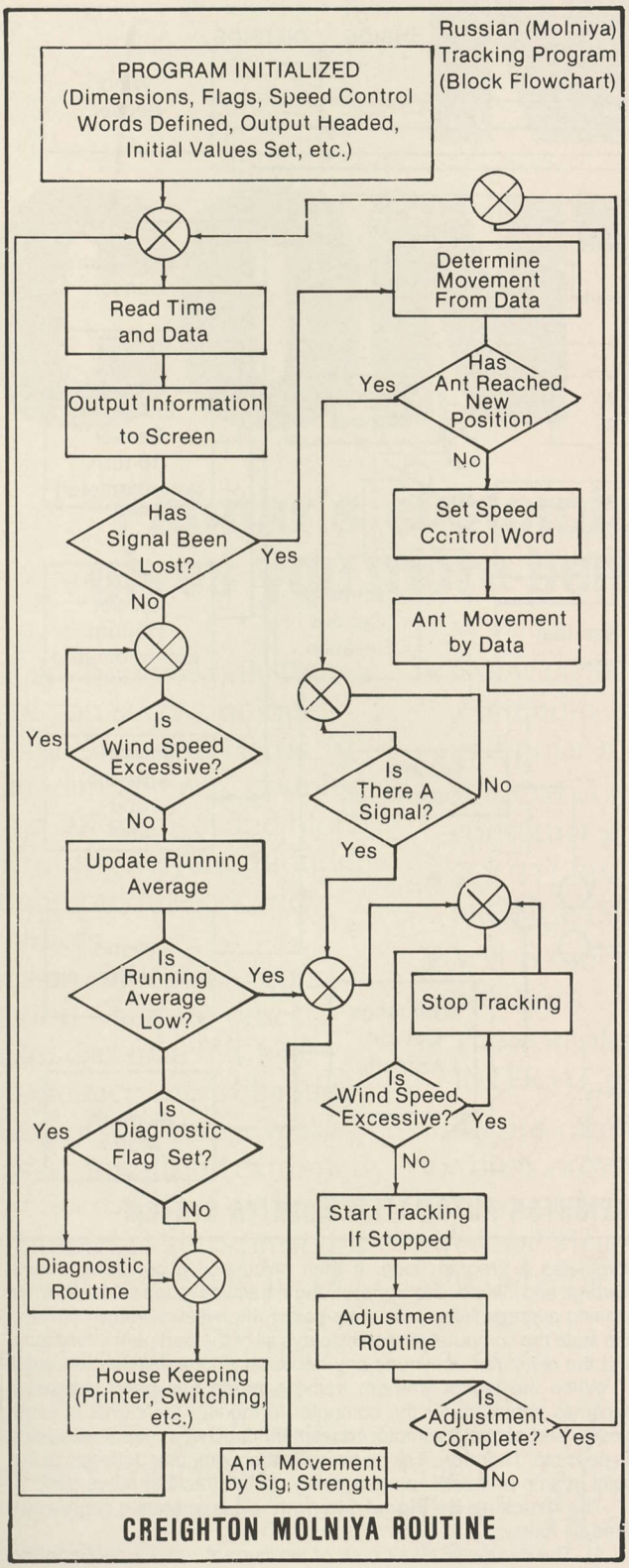
$$rdg = rpg \frac{(8 * 360)}{100}$$

where r_{dg} is the radius of the drive gear, r_{pg} is the radius of the potentiometer gear, and 8 * 360 is the range in degrees of the potentiometer gear when turning 8 revolutions. Such a gear would have a radius of approximately 14 inches.



ELEVATION (top) **and azimuth** (right of center) **control systems.**

by
Lee Lubbers, S.J.; Director
Francis Lajba; System Designer
Creighton University Sat Net
2500 California Street
Omaha, Ne 68178



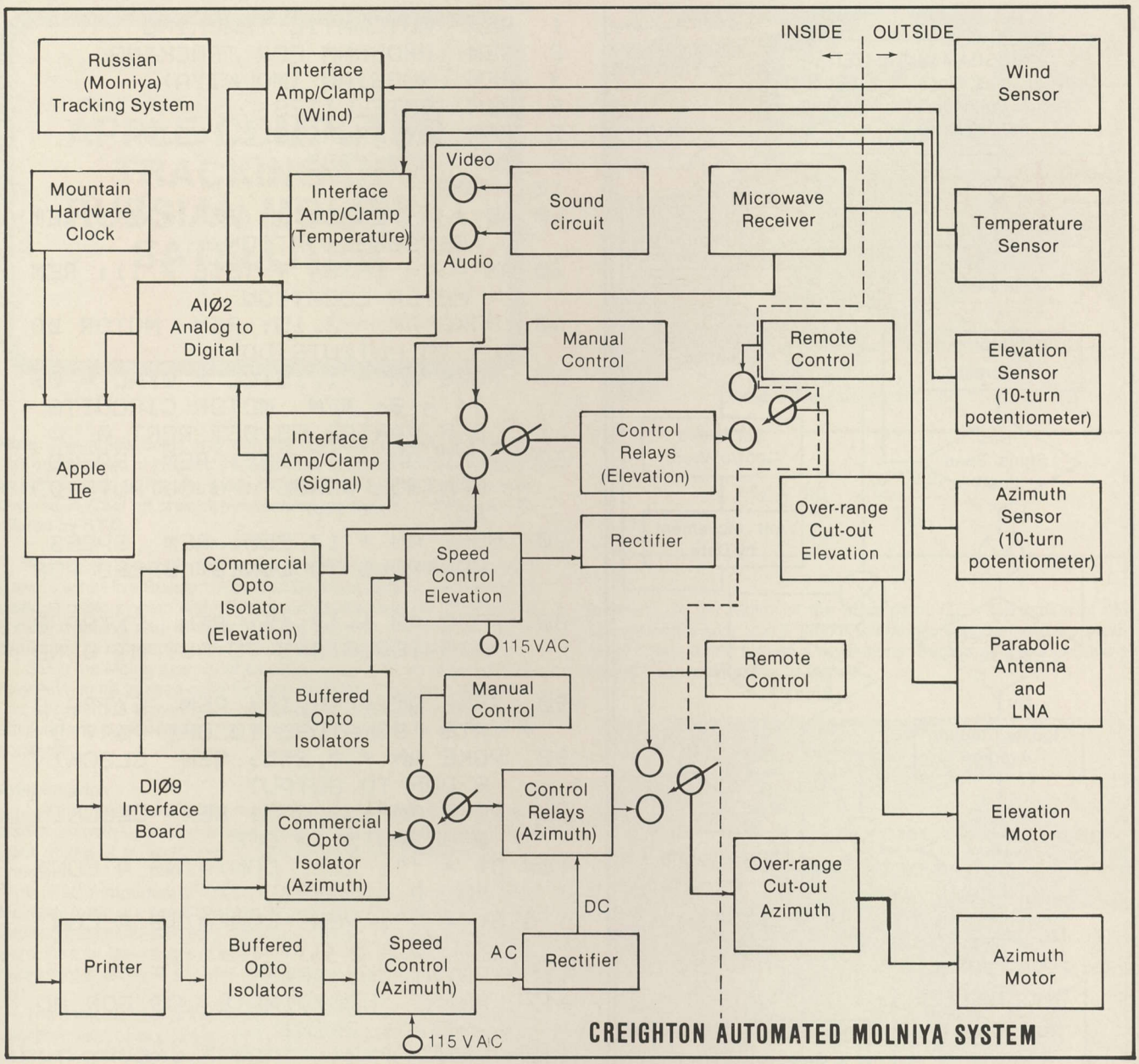
CREIGHTON MOLNIYA ROUTINE

Interfacing The Apple

Fortunately, commercial interfaces are available for the Apple enabling the computer to sense the exact position (azimuth and elevation) of the antenna as well as detecting the receiver signal level on a continuous basis. Thus when the signal deteriorates the Apple will activate the relays for the azimuth and elevation motors allowing

```
1   REM  AUTOMATIC TRACKING
2   REM  PROGRAM FOR TRACKING
3   REM  RUSSIAN (MOLNIYA)
4   REM  SATELLITES
5   REM  BY FRANCIS E. LAJBA
6   REM  MAY,1983
10   HOME
20 AQ =  - 16384 + (256 * 7): REM
     SENSOR LOCATION
30 AM =  - 16384 + (256 * 1): REM
     MOTOR LOCATION
40   POKE AM + 3,15: REM  MOTOR DD
     R TO OUTPUTS DDRA
50   POKE AM + 1,15:CC = 0:AC = 0:
     II = 0: REM  MOTOR CIRCUITS
     OFF,VARIABLES SET PORT A
60   POKE AM + 19,255: REM  SPEED
     CONTROL DDRSET TO OUTPUTS DD
     RC
70   POKE AM + 17,255: REM  SPEES
     CONTROLS TO LOWEST SPEED POR
     T C
80   POKE AM + 18,15: REM  EXTRA O
     PTO ISOLATORS TO OUTPUT DDRD

90   POKE AM + 16,15: REM  EXTRA O
     PTO ISOLATORS TO OFF PORT D
92   POKE AM + 2,255: REM  CLOCKIN
     G DDR TO OUTPUT
94   POKE AM + 0,255: REM  CLOCKIN
     G OUTPUTS TO OFF
100 D$ = "": REM  CONTAINS A CONT
     ROL D
110 G$ = "": REM  CONTAINS A CONT
     ROL G
115   PRINT D$;"PR#3"
117   PRINT "COORDINATE LOG FOR MO
     LNIYA": PRINT
118   PRINT "MO"; TAB( 5);"DY"; TAB(
     9);"HR"; TAB( 12);"MN"; TAB(
     16);"AZ"; TAB( 20);"DEG"; TAB(
     25);"EL"; TAB( 29);"DEG"; TAB(
     34);"SS";"  "
120   PRINT D$;"PR#0"
122   HOME
130   DIM N(50): REM  DIMENSION FO
     R SUBROUTINE 1500
140 LL = 15:PP = 5: REM  SEE SUBR
     OUTINE 1500
150   REM  SPEED CONTROL VARIABLES
      DEFINED AS FOLLOWS
160   DIM AS(20): DIM ES(20)
170 AS = 0:ES = 0
180   FOR X = 0 TO 15
```



CREIGHTON AUTOMATED MOLNIYA SYSTEM

the system to re-search for the optimum signal (level). The interfaces we have in use are very satisfactory and entirely dependable (manufactured by **Interactive Structures, Inc.,** Bala Cynwyd, Pa.). These include (1) a 16 channel 8 bit analog input card (analog to digital converter), (2) a 32 line parallel digital interface, and, (3) an optically isolated interface module(s). Co-author Lajba added other external circuitry of his own design, namely a pair of optically isolated boards, a speed control board, and a receiver changeover board. These make it possible to track at varying speeds and avoid bypassing the desired signal.

The Computer Program

Reference is made to the 'flowchart.' The automatic tracking program uses three modes: **(1)** quiescent, **(2)** tracking by signal strength, and **(3)** tracking by data.

In the quiescent mode the computer is not moving the antenna but only monitoring the signal strength to determine when the antenna **should be moved** to maintain signal integrity. When the program first enters this state it calculates an initial average of a pre-chosen number of signal strength readings, making the readings each time it completes a program loop. It then calculates a constant running average and initiates the signal strength tracking mode as soon as this running average falls sufficiently below the initial average. While in this state the computer screen displays all of the pertinent information and the computer continues any necessary housekeeping chores.

When the signal strength tracking mode has been initiated it becomes important for the computer to monitor the signal strength closely and control the motor-movement directives output as quickly as possible. Therefore it skips over all other computer activities at this point in time and concentrates solely on the tracking movement.

The **'Tracking By Signal Strength'** cycle operation can be outlined as follows:

1) The computer takes note of the current running average (or, takes an average, depending upon the circumstances, **before** entering this mode) and moves the antenna far enough to the west to determine a 'Lower West Boundary' (i.e. any further movement westward would lose the signal).

TEXT continues/ page 16
PROGRAM continues/ page 13

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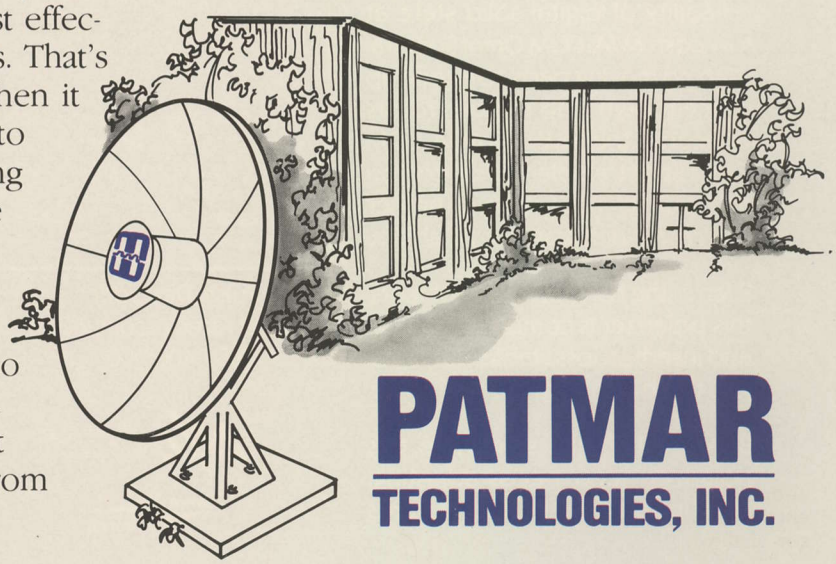

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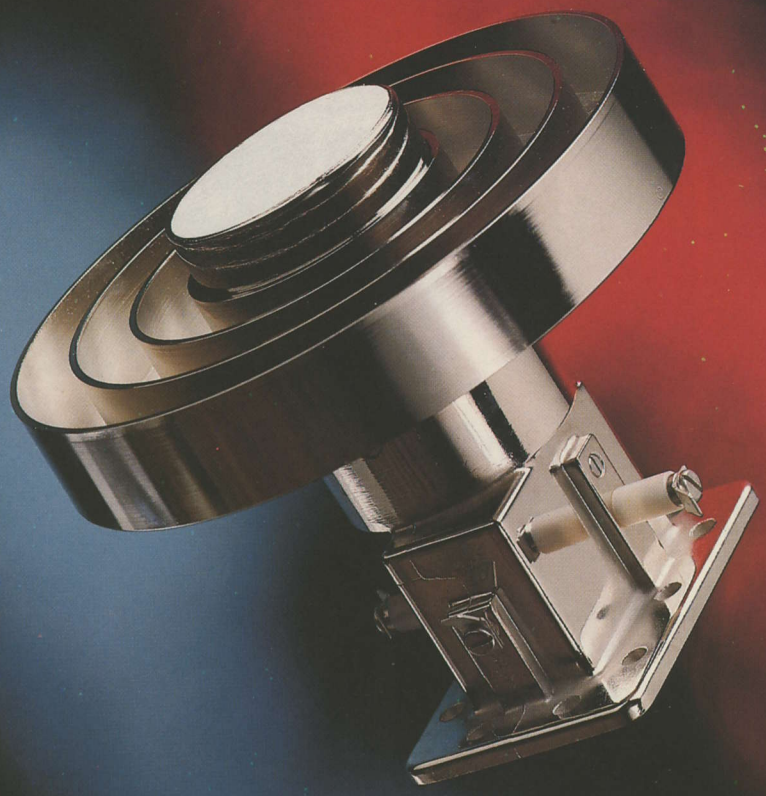

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Only one polarizer offers you the reliability of digital solid state at low cost: M/A-COM Omni Spectra. With no moving parts to freeze up or meltdown – no motors, rotors or gears – the low loss M/A-COM Omni Spectra polarizer offers you top quality reception, whether you're in Anchorage or Anaheim.

Even in the harshest environments, this polarizer is completely phase and insertion loss stable. But that's just the beginning.

Because it's digital solid state, this polarizer never needs adjusting, after installation. It even features an adjustable scalar feed to acheive maximum gain from every antenna. Satellite skew is automatically compensated for.

Omni Pulse Decoder
Low cost receiver compatible adapter
Part # 4850-4004-00

In-line design makes the M/A-COM Omni Spectra polarizer easy to install. And with low cost electronic adapters, it's completely receiver compatible.

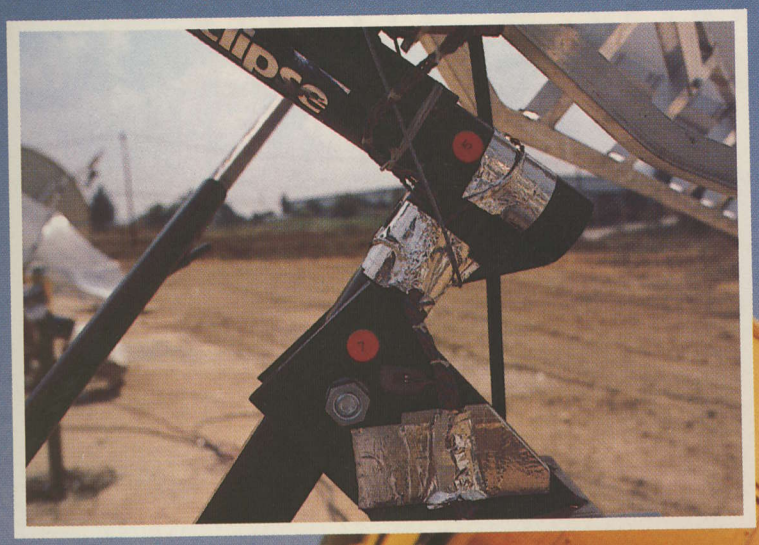
Best of all is the backing of an industry leader: M/A-COM Omni Spectra. For the name of the authorized dealer near you, call (603) 424-4111 or write: 21 Continental Boulevard, Merrimack, NH 03054.

M/A-COM Omni Spectra

M/A-COM OMNI SPECTRA, INC.

```
190 AS(X) = AS:ES(X) = ES
200 AS = AS + 16:ES = ES + 1
210  NEXT X
220 A0 = 0:E0 = 0:WM = 100: REM
     INITIAL AZ AND EL AND MAX WI
     ND SPEED
224  DIM D(20): REM  DIMENSION FO
     R SUBROUTINE 700
225 D(1) = 0:D(2) = 31:D(3) = 28:
     D(4) = 31:D(5) = 30:D(6) = 3
     1:D(7) = 30:D(8) = 31:D(9) =
     31:D(10) = 30:D(11) = 31:D(1
     2) = 30: REM  DATA FOR SUBRO
     UTINE 700
230 DF = 0:WF = 0:SUM = 0:DE = 0:
     DA = 0
232 PF = 0
233 SF = 0:SQ = 1:T0 = 0
234 DG = 0: REM  CHANGE TO DG=1 F
     OR DIAGNOSTICS
235  GOSUB 8000
240  IF AC = 1 GOTO 385
250  GOSUB 700: REM  READ TIME
260  GOSUB 1000: REM  READ SENSOR
     S
270  IF DF = 1 GOTO 370
280  IF T0 = 0 THEN T0 = TM
285  IF (TM - T0) < 1 GOTO 360
287  PRINT D$;"PR#3"
289  IF PF = 0 GOTO 298
291  VTAB 21: PRINT "* * * * * *
     * * * * * * * * * * * * * *
     * *"
293  VTAB 21: PRINT "*          S
     ATELLITE CHANGE-OVER
       *"
295  VTAB 21: PRINT "* * * * * *
     * * * * * * * * * * * * * *
     * * "
297 PF = 0
298  VTAB 21
300  PRINT MT; TAB( 5);D; TAB( 9)
     ;H; TAB( 12);M; TAB( 16);AZ;
      TAB( 20); INT ((.725 * AZ) -
     94.25); TAB( 25);EL; TAB( 29
     ); INT ((.403 * EL) + 6.5);
     TAB(34);SS;"  "
310  PRINT D$;"PR#0"
320  VTAB 21: PRINT "
          "
330 T0 = 0
350  IF DF = 1 GOTO 370
```

PROGRAM continues/ page 16



HURRICANE

Your new antenna is all set up, adjusted, fine tuned and the service technician is on his way back to the shop. Now the real test begins. Will it continue to perform? For how long will it maintain the picture quality it has today?

Your antenna will have to face the wind and weather every hour of every day of its life. This will be its toughest test. To survive, you'll need equipment strong enough to take whatever nature can throw at it. You'll need Paraclipse.

It is impossible to gather conclusive data about the effects of storm generated stress on an antenna unless you can control the storm. We wanted to put our equipment through an intense, concentrated weather test to measure its

PIONEER MEMBER OF SPACE

Paraclipse

HIGH PERFORMANCE SATELLITE TELEVISION SYSTEM

performance, so we hired a "professional hurricane" to see if we could break a Paraclipse.

We dumped 337 gallons of water per minute into a 95 mph windstream to create the wind load equivalent of a 140 mph storm. Each antenna was tested at five different elevation settings and was blasted from eight different angles.

After several hours of abuse, both Paraclipse antennas emerged undamaged and in perfect shape. Off-air satellite signal evaluation at the end of the tests, indicated the Paraclipse antennas maintained the same electrical parameters as prior to the tests. After testing, measurements show no warping or distortion of the welded aluminum truss structure or mount assembly. Both antennas, in spite of loads to which they were subjected, maintained parabolic symmetry and accuracy. Neither antenna suffered any damage; not one piece of mesh was bent or one clip lost. Both antennas were absolutely stock items assembled according to standard instructions.

The welded aluminum Rib & Ring Truss System pioneered by Paraclipse is still the lightest, strongest, most accurate design available. The concentric ring trusses, to which the heavy expanded aluminum mesh is fastened, form a perfect compound parabolic shape that even a hurricane can't bend. The all steel polar mount and base are powder coated to further seal and protect them from the elements.

A Paraclipse system has the structural strength and dimensional stability to maintain the integrity of its parabolic shape under the worst of conditions. Paraclipse materials are chosen for their lightweight strength and corrosion resistant properties. Every aspect of the Paraclipse design represents strength in performance.

Paraclispe, strong, lightweight, weatherproof, shippable, easily assembled with simple hand tools, an affordable quality antenna from a very reputable manufacturer.

Dollar for dollar, you just can't buy more performance.

Paradigm Manufacturing, Inc.
6911 Eastside Road
Redding, California 96001
(916) 244-9300

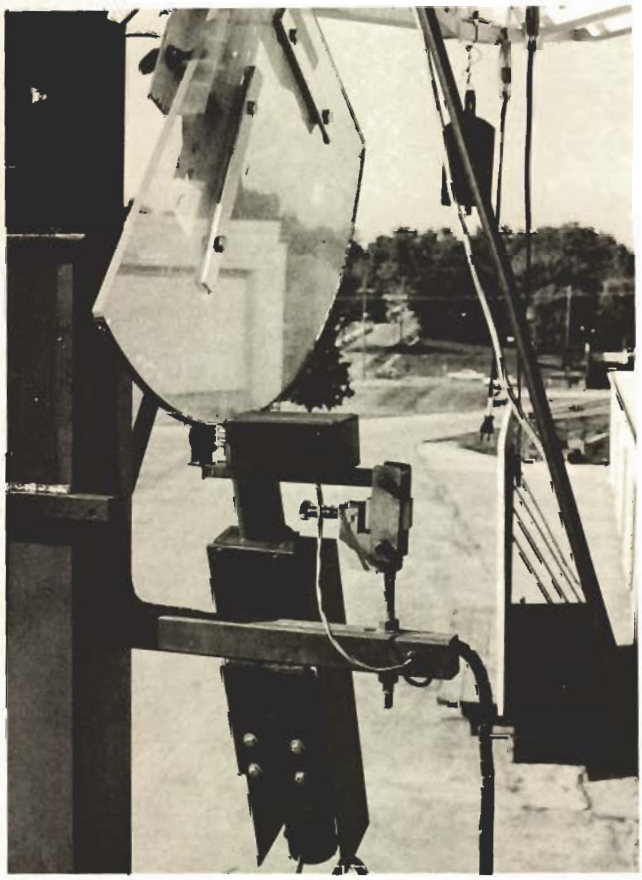
PROGRAM/ continued from page 13

```
360  GOSUB 1500: REM  SIGNAL STRE
     NGTH STARTER.
370  IF DF = 0 GOTO 385
380  GOSUB 2000: REM  CALCULATE P
     REDICTION DATA
385  IF AC = 0 GOTO 388
386  POKE AQ + 1,0:AZ =  PEEK (AQ
     )
387  POKE AQ + 1,1:EL =  PEEK (AQ
     )
388  IF AC = 1 OR DF = 1 GOTO 394

390 E0 = EL:A0 = AZ
394  POKE AQ + 1,3:WS =  PEEK (AQ
     ): REM  WIND SPEED
395  IF WS <  = WM GOTO 398
396  POKE AM + 1,15:WF = 1: GOTO
     490
397 WF = 0
398  POKE AQ + 1,2:SS =  PEEK (AQ
     )
400  IF AC = 0 OR DF = 1 GOTO 410

405  GOSUB 5000
410  IF AC = 1 OR DF = 0 GOTO 470

420  GOSUB 6000: REM  MOTOR SPEED

470  GOSUB 7000
472  IF AC = 1 GOTO 485
474  POKE AQ + 1,3:WS =  PEEK (AQ
     )
476  IF WS <  = WM GOTO 482
478  POKE AM + 1,15:WF = 2: GOTO
     490
480 WF = 0
482  POKE AQ + 1,2:SS =  PEEK (AQ
     )
483  IF (S - SS) > 5 THEN DF = 1
484 S = 0: IF SS < 100 THEN DF =
     1
485  IF WF = 0 GOTO 530
490  POKE AQ + 1,3:WS =  PEEK (AQ
     )
492  VTAB 17: HTAB 14: PRINT  INT
     (WS / 2);"  "
500  IF WS > WM GOTO 490
510  GOSUB 7000
515  IF WF = 1 GOTO 397
520  IF WF = 2 GOTO 480
530  IF DG = 0 GOTO 550
540  GOSUB 9000
```

TEXT/ continued from page 10

2) The computer then moves the antenna eastward while monitoring the signal strength and determines the 'maximum signal' by overshooting it slightly.
3) It then brings the antenna back to the west while again determining a maximum. If these maximums correlate closely enough, the azimuth search is complete. If not, it tries again.

A similar search is then performed for the elevation drive. When this search is complete, the computer returns to the quiescent state.



ELEVATION potentiometer and drive gear.

Motor Speed

It is quite important that the computer process information somewhat faster than the antenna is moved; so a dual 4-bit digital to analog speed control addressed by the computer lets the computer select an appropriate speed. Thus when greater precision is necessary, the motors turn more slowly and the antenna is finely homed in on the satellite.

In this way once the antenna is on the satellite, it will follow the satellite until the satellite cuts off **(*)**. When this happens, the computer checks to see if it has any current data (time and AZ-EL coordinates). If not, it waits for the signal to come back on (i.e. the satellite has experienced a **momentary interruption** in transmission). If the computer has the data in file telling it that this is an expected procedure **(*)**, it then initiates the 'Data Tracking Mode' and moves the antenna to the next (expected) satellite location.

In this data tracking mode the computer calculates how far the antenna is from where it is going and then moves the antenna in two planes at once with speeds in each plane set according to the distance the dish has to move. Thus when far away, it moves quickly but as it gets close to the intended location for the next satellite, it moves more slowly to fine tune for the satellite. When the antenna arrives at its data destination, the computer checks for the presence of signal in the signal strength mode and initiates the signal tracking mode to lock

REMOTE CONTROL EARTH STATION RECEIVER

ESR240 INFRARED REMOTE CONTROL RECEIVER

In the Drake tradition...The ESR240 infrared remote control earth station receiver incorporates the latest technical innovations and built-in features while continuing time-honored Drake styling and impeccable workmanship. The ESR240's standard features set it apart from all the others: ● Infrared remote control ● Attractive styling ● Digital LED display ● Touch "memory" switches with LED indicators ● Fixed and variable audio tuning for all subcarriers ● Channel "scan" function ● Crystal-controlled modulator — Channel 3/4 ● Full metering ● Automatic TV/Satellite antenna switching ● Polarotor T.M. I interface with format indicator ● Electronic polarity adjustment.

Add the performance and remote control versatility of the ESR240 to your satellite earth station. The Drake ESR240 will be the standard of excellence for years to come. Demand a Drake!

Polarotor T.M. is a trademark of Chaparrel Communications, Inc.

See your local Drake dealer or contact us for further information.

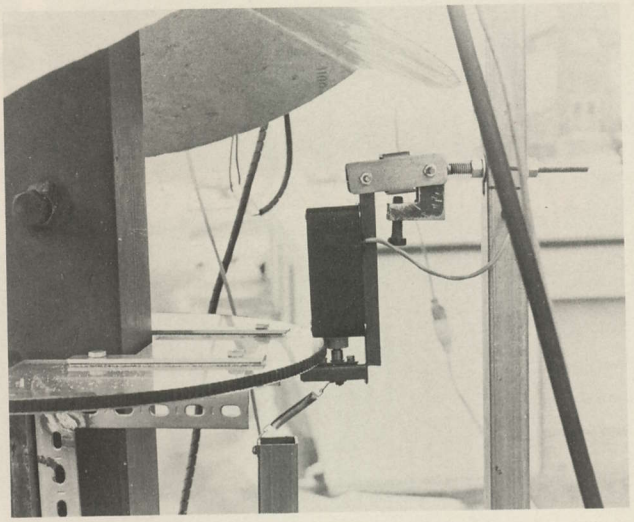
R. L. DRAKE COMPANY

DRAKE®

540 Richard St., Miamisburg, Ohio 45342. USA
Phone: (513) 866-2421
Telex: 288-017

PIONEER MEMBER OF SPACE

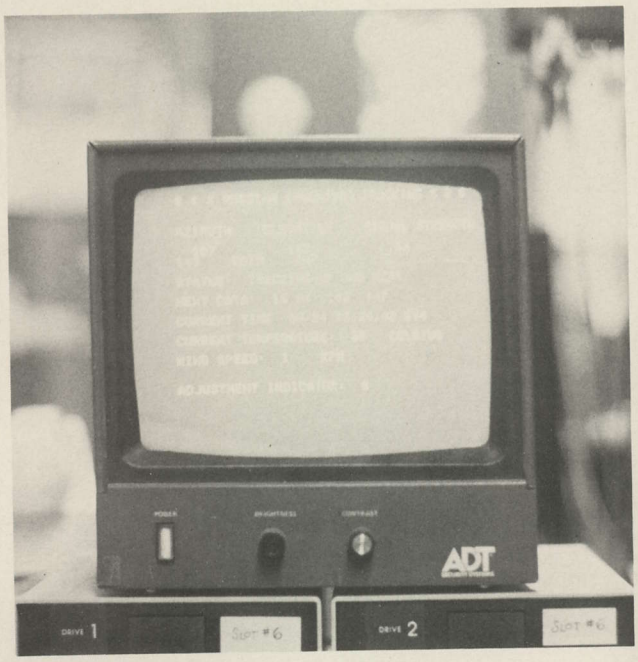
```
550  IF AC = 1 OR MV = 1 OR MV =
     2 OR MV = 3 GOTO 240
560  GOSUB 10000
650  GOTO 240
700  REM  READ TIME FROM CLOCK
705 DT = 0:DD = 0
710  PRINT D$;"IN#4": REM  SLOT 4

720  PRINT D$;"PR#4"
725  VTAB 23
730  INPUT "  ";T$: REM  T$ = CUR
     RENT TIME MONTH/DAY HR.MIN,S
     EC
740  PRINT D$;"IN#0"
750  PRINT D$;"PR#0"
753 MT =  VAL ( MID$ (T$,1,2))
755 D =  VAL ( MID$ (T$,4,2))
760 H =  VAL ( MID$ (T$,7,2))
770 M =  VAL ( MID$ (T$,10,2))
772  FOR I = 1 TO MT:DT = DT + D(
     I): NEXT I
774 DT = DT + D
776  IF MT > 2 AND L = 1 THEN DT =
     DT + 1
780 TM = 1440 * DT + 60 * H + M
785  VTAB 7: PRINT "
                              "
790  IF RF = 1 GOTO 820
800  READ MO,DY,HR,MN,A,E
802  FOR I = 1 TO MO:DD = DD + D(
     I): NEXT I
804 DD = DD + DY
806  IF MO > 2 AND L = 1 THEN DD =
     DD + 1
810 TD = 1440 * DD + 60 * HR + MN

812 RF = 1
820  IF TM - TD < 10 GOTO 840
830 RF = 0
840  IF  ABS (TM - TD) > 5 GOTO 8
     50
842  VTAB 7: PRINT A;"    DATA
      ";E
845  IF DF = 0 GOTO 850
848 E0 = E:A0 = A
850 ED = E0:AD = A0
860  IF ED = DE AND AD = DZ THEN
      RETURN
870 AF = 0:EF = 0
900  RETURN
1000  REM  READING INPUT FROM AI0
     2 (AZ,EL,TP) AND DISPLAY
```



AZIMUTH POT (just right of center) **and drive disc.**

once again on the optimum signal.

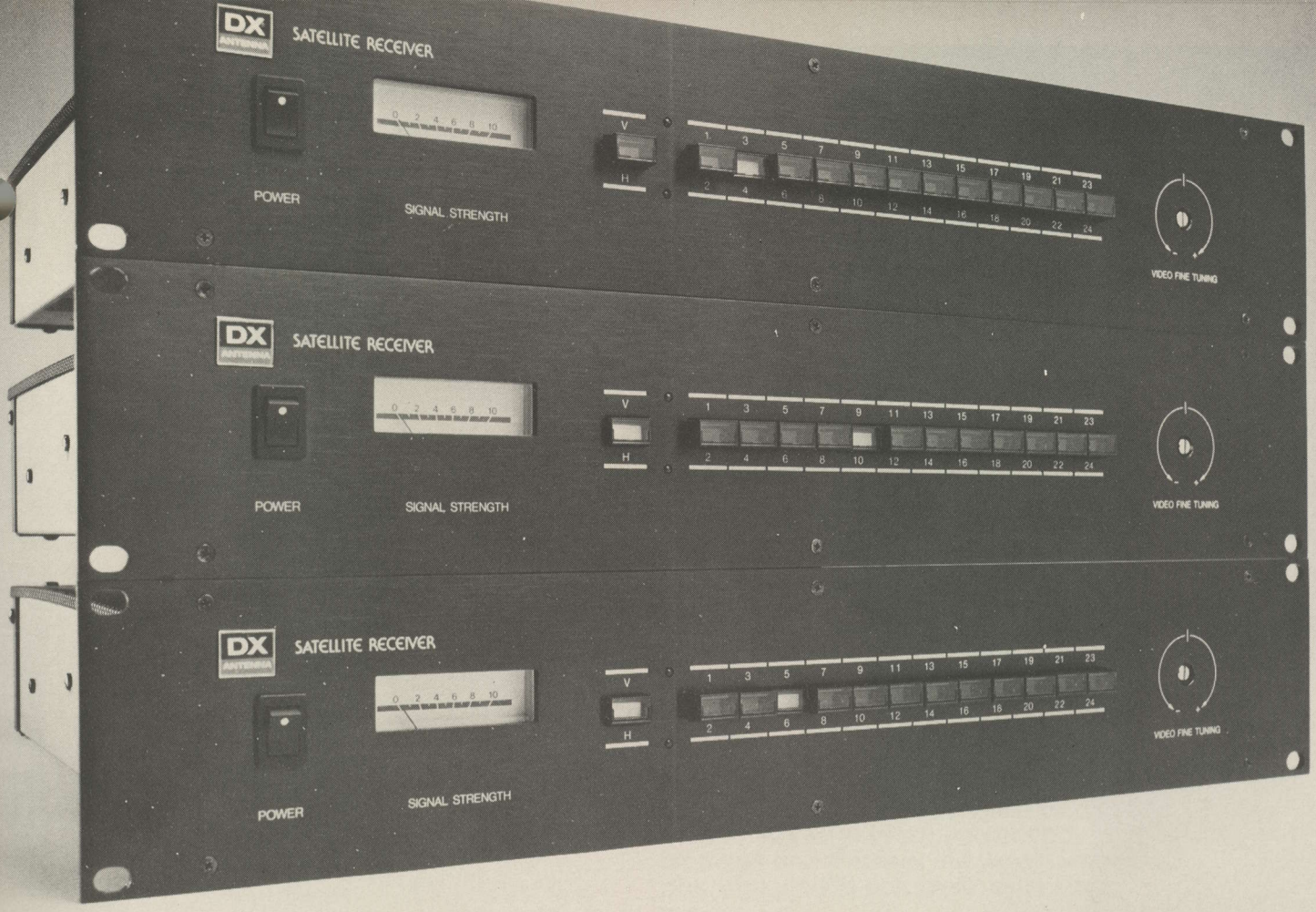
*** — Molniya's orbit is elliptical passing northward over North America from west to east, looping from north through east and then south over Canada's Hudson Bay region. The individual satellites transmit for approximately** 6 hours each **during their North American loop-pass and then turn off. As one satellite turns off, while traveling south over North America out of the 'loop,' a replacement satellite just starting its northward trek over the same approximate path** turns on. **When the first satellite has completed its six hour transmit stint and turns off the Apple checks its data file to determine if this is a 'time' and a location where the bird can be expected to turn off. Finding this to be the case, the computer directs the dish to the more western location where the** next satellite **in the series can be expected to be turning on.)**



DISH movement by data.

PROGRAM continues/ page 60

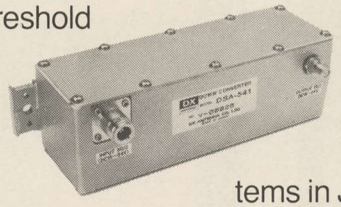
MOLNIYA TEXT continues/ page 22



DX Gives You Big System Quality at Small System Prices.

Now you can have top quality performance for a surprisingly reasonable price. The DSA-643 Satellite Receiver from DX features dual, **block downconversion**—unique for receivers in this price range. The DSA-643 uses a discriminator circuit for signal demodulation; a full 30 MHz bandwidth; and a unique threshold extension circuit. These features add up to a low threshold carrier to noise ratio, commercial quality reception and low cost installation in any system.

DX also provides the DSA-541 Block Downconverter. It features a highly stable ceramic resonator, with a fixed frequency of 2800 MHz. Stability is maintained at a remarkable ±1 MHz over the entire −30° to +50°C temperature range. So you can install the downconverter out of doors, at the dish, without concern for frequency drift caused by temperature changes year after year.



The innovative DSA-643 Satellite Receiver and DSA-541 Block Downconverter are brought to you by DX, one of the most respected names in satellite television reception systems in Japan and around the world. DX also provides line amplifiers, power dividers, and other block downconversion-compatible accessories.

DX ANTENNA

DX Communications, Inc., A Subsidiary of C. Itoh & Co. (America) Inc.,
116 Midland Ave., Portchester, N.Y. 10573 (914) 939-8880
Manufactured by DX Antenna Co., Kobe, Japan.


WINEGARD

DESIGNED FOR THOSE WHO TAKE THEIR SATELLITE TV SERIOUSLY!

Sharp, clear pictures. That's what you expect from a sophisticated home satellite TV system. And that's what you get from Winegard!

The new SC-5000S motorized 8-foot package includes a sophisticated satellite video receiver for a dramatic difference in satellite TV reception. You get superb features like an audio tune control to adjust to any frequency in the 5.5 to 8.0MHz range; signal strength meter for precise antenna alignment; fine tune control to lock in the best picture on each channel; rapid scan control for locating satellites and positioning the antenna; channel select control with LED channel read-out; a polarity switch for satellites where polarization is reversed; a built-in satellite select knob with LED read-out moves the dish east or west. The receiver also features a built-in, selectable channel 3 or 4 modulator. A downconverter is included that mounts directly to the LNA at the feedhorn, eliminating line loss.

The sleek new receiver has rear panel connections for optional remote channel control; audio output for stereo processor and connections for Winegard's satellite selector. Each and every unit must pass our rigid quality control standards.

EVERYTHING YOU'D EXPECT BUT MORE. . .

Winegard's 8-foot dish is one you can handle anywhere! Easy to inventory, easy to transport, and best of all, simple to install! Weighs only 60 pounds and requires no more than four hours installation.

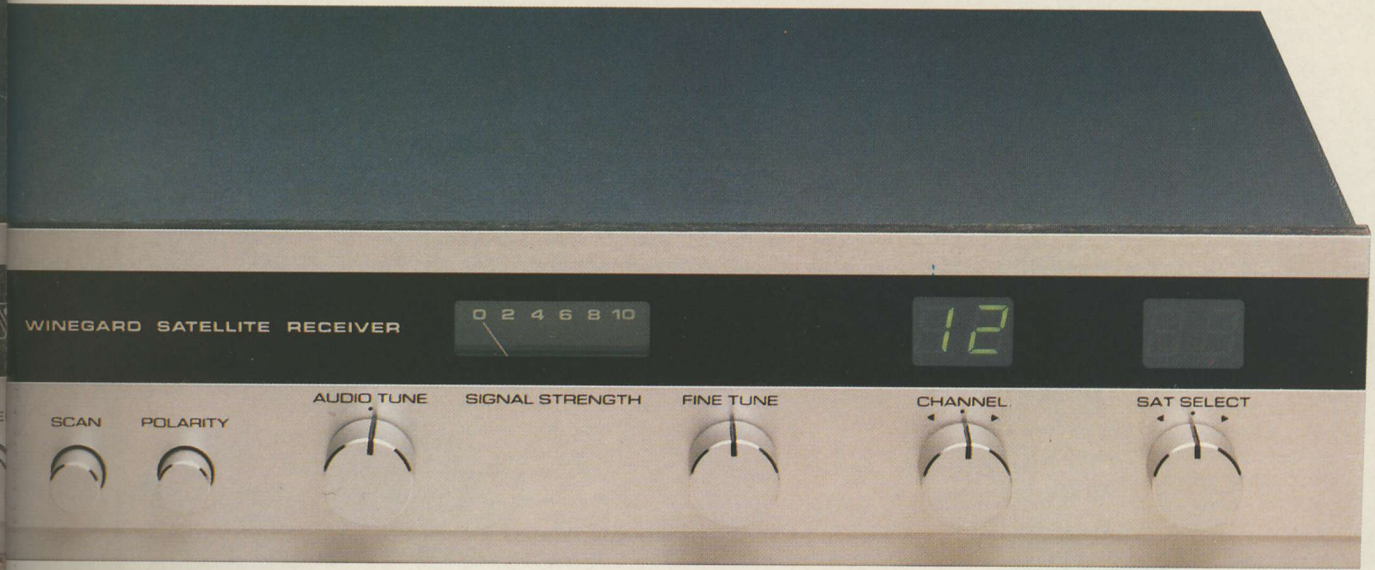
It covers the 3.7 - 4.2GHz band efficiently with 37.5dB gain. Wind survival is 90 mph. The feed is prime focus and enclosed in a weather-tight shroud along with a Polarotor ™ automatic polarity unit, LNA and converter.

The 8-foot dish is heavy .090-gauge spun aluminum. A special weather-resistant, baked epoxy paint in parchment white provides long-life and attractive appearance.

For installation convenience, Winegard offers two types of rugged polar mounts — "pedestal" with a base that secures to a concrete pad or "post mount" that sinks into a cement base 18″ in diameter and 4′ deep. The Winegard 8-foot package is 100% complete, even includes 150′ cable.

THINKING TVRO?. . . LOOK AT WINEGARD!

Take a look at quality! Take a look at pricing! Take a look at the finest home satellite TV system in America! Take a look at Winegard! Designed for those who take their satellite TV seriously.



FOR COMPLETE SPECIFICATIONS, WRITE:

WINEGARD®
SATELLITE SYSTEMS
T.M.

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MOLNIYA TEXT/ continued from page 18

Wind Speed

The high winds found on occasion in Nebraska shake the antenna mount just enough to put the tracking program into a frenzy. To cope with this, the computer reads the wind speed prior to reading the signal strength. Should the wind be strong enough to possibly cause erroneous readings, the computer ignores the signal strength readings. Thus in the event of high winds, the computer ceases all operational modes until the wind drops to a tolerable level. At this point the computer takes up where it left off and the system is back into automatic operation.

Extra Apple Chores

Just so you won't think that tracking satellites is all that the Apple can do, we want to alert you to other occupations which it performs in its spare time (while in the quiescent mode).

1) We have it 'beep' at certain times to alert student workers to some chores to be performed at certain times.
2) We have the computer address a video/audio/power switching bank for program changing at precise times and controlling related devices (i.e. VTRs) automatically.
3) And to make it easier for us to maintain records on the habits of the Molniya birds, we also make the Apple print out the log data (time/coordinates/signal strength) of the tracking program every sixty seconds.

Special help in mastering this automatic tracking system will be offered at the next **Satellite Conference for Schools,** to be held at Creighton University in Omaha this coming May 21-24. In the interim, Francis Lajba will be glad to answer your questions by telephone **(402/280-4063)** any weekday afternoon. Additionally, another member of the Molniya team, Ron Nelson, is able to build and tune the audio boards for the Molniya video/audio reception **(**)** and he may be reached at the same telephone number.

(— Molniya, along with some other Russian satellites, transmits its audio in a brief segment of the line/sync signal. A normal audio decoder will** not **extract audio from such a transmission as you must literally remove the audio** 'bits' **from the video line at a precise point in time. This** 'sound-in-syncs' **system requires special treatment, and has been covered in** CSD **in the past. Unless you are an electronics tinkerer, you are well advised to take up the Creighton offer to create such a board for you since it requires special talents and unusual skill to make function from scratch;** editor.)

NOTE: A proposal by author Lubbers to create an international association of universities and colleges exchanging video learning information via satellite was detailed in the **August 1983** edition of **CJR.** Those dealers interested in how they can interest their local centers of higher education in satellite services can still obtain a single copy of the **August CJR** by sending $5 to **CJR, P.O. Box 100858, Fort Lauderdale, Fl. 33310.** A very exciting selling opportunity awaits those dealers willing to work with local educators and author Lubbers has made himself available to help you as a dealer with that project.

CREIGHTON University's TVRO antenna farm; the Russian Molniya antenna is the one that is pointing 'backwards' **or away from the camera; north!**

SUPER HOT DISH COMBINES ENERGY COLLECTION AND TVRO FUNCTIONS

Editor's Note: Although author Mahan references his system with descriptions of the 'fire-power' which should serve as a caution to the unwary, this additional warning. The temperatures capable of being created by a reflector turned into a solar-bolic are mind blowing. Cremation is virtually instant and loss of a limb or permanent loss of eyesight, for example, comes with the snap of the fingers. **Any surface that can melt steel or aluminum in seconds is to be totally respected.** Mahan has either been very careful or very lucky to date. Anyone who contemplates similar experiments must be cautioned about the tremendous heat and power of the 'furnace.' At the very least, see that the dish is properly protected with an encircling fence that will keep wandering animals and children out of the way of this tremendous heat.

I decided to build the solar-TV unit because I could not justify to myself the $4,000 cost of a dish system for a TVRO receiver. However, I could and would justify $4,000 for a solar heater which over a period of time would pay for itself in gained heat, tax credits, or both. And the fact that it also funtions as a TVRO gave me something to do with the time which I previously spent cutting wood for heat!

To start with, one must find a material which will make the dish surface bright and reflective. **Chrome?** Too costly for something so large. **Mirrors?** Perhaps, but unknown was how the glass reflective surface might adversely affect the TVRO performance. Additionally, this portion of Kansas experiences much hail and hail breaks glass. **Mylar?** It probably would not stand-up to our weather. My final choice was a new 3-M product then first being tested for solar applications; FEK-244. I discovered that while FEK-244 had indeed been thoroughly tested and found to retain a high percentage of its 'shine' over time, it had only been tested with a backing of aluminum. So I began my search for an aluminum TVRO dish and the search ended with **Birdview.**

From this point I began with the design of the tracking system. It works on a series of relays, switches, selonoid valves, hydraulic cylinders, hydraulic pumps, electric eyes, thermal switches . . . and so on. The project quickly required a draftsman since it was becoming more involved by the day!

Basically, this is how it works. The sun comes up, or it pops from behind a cloud. This shines into the electric eye and that turns the system on. The unit (dish) makes a horizontal (latitude) change from the satellite belt to the 'solar belt' and then the dish scans from west to east until the sun shines directly into the electric eye. This stops the dish motion and if everything aligns properly the sun shine is focused by the reflector to a three inch 'hot spot' on the center of the boiler located at the focal point. When the sun moves far enough that the sunlight is no longer properly aligning with the electric eye, the dish moves again (west) repeating this cycle until dark; or, adverse weather (whichever comes first).

To watch satellite TV, a switch inside the home moves the dish into the TV 'mode' and the dish returns from the **sun** belt to the **satellite** belt. In this process the boiler 'arm' works but those who might wish to try similar projects can contact me directly for system drawings and notes.

After working out the bugs in the tracking system, then the hard part began; making the dish 'shine.' The dish is 9 feet in diameter and it is spun aluminum. The paint on the dish is as 'hard as glass.' I have to hand it to Birdview; they really know something about painting a dish surface; no chemicals could be found to remove the paint and I had to hand-sand the entire surface to remove the paint and then flatten down the small grooves and ridges left behind by the metal spinning process. Then came a twenty hour job of cutting and applying the 3M reflective surface. With care, you can do an almost 'perfect' job with the 3M material. And now it was time to test the system.

It was March. And it was cold, snowing, and cloudy for a week. Finally one day there was sunshine! Just standing close to the dish and one could feel the 'glow' of tremendous heat and energy.

The first thing you notice is a 'blue glow' about a foot long in the region of the focal point. This is where the heat is 'cooking' the humidity right out of the air. The time had come for the first 'scientific' test. Gingerly I placed the end of a wooden 2x4 in front of 'the sucker.' The result? It sounded like a torch exploding into life. There was so much smoke that I discontinued that 'test.'

Time for test number two; equally scientific.

I wondered what the maximum 'output potential' of the 'machine' might be. The test material chosen was 1/8th inch thick aluminum plate, painted flat black on one side and held with great precision for test purposes in place by some duct tape at the end of a (long!) stick. As I was trying to work the mechanism to position the flat plate it also 'exploded' in a puff of smoke. **End of scientific test number two.**

Undaunted, time for scientific test number three.

A length of 1/8th thick iron was carefully suspended at the focal point. This test set a record; it took ten seconds to terminate the test as the molten iron ran down the piece holding the iron in place and began dropping onto the 3M surface destroying the surface. **End of scientific test number three.**

Satisfied that there was more than ample heat available for the system, the next test was the real one. The boiler was bolted into position (with the dish moved off of the sun, of course!). And then the dish re-acquired the sun. Instant success. Smoke, hissing noises and big flakes of black paint falling off the boiler. **Conclusion?** Just because the printed words on a can of spray-on paint do NOT tell you **not to use** the paint for high heat applications does not mean that you **can use** the paint for that purpose. This problem was solved by locating some appropriate 'solar paints.' And now the boiler sounds like a Tea Kettle turned up to high and the water just sizzles through the boiler.

Some Problems/ Some Answers

It quickly became obvious that the wiring to the LNC could not be properly routed out of harm's (the heat) way. And, the LNC was in a

by
Monte R. Mahan
RR 1, Box 68
Greeley, Ks. 66033

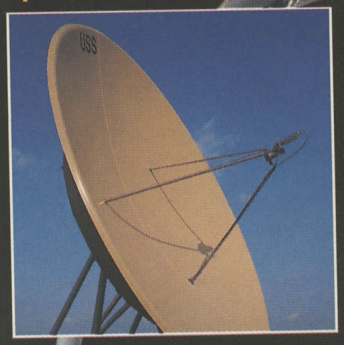
Track Through The New USS™ SR-1 System

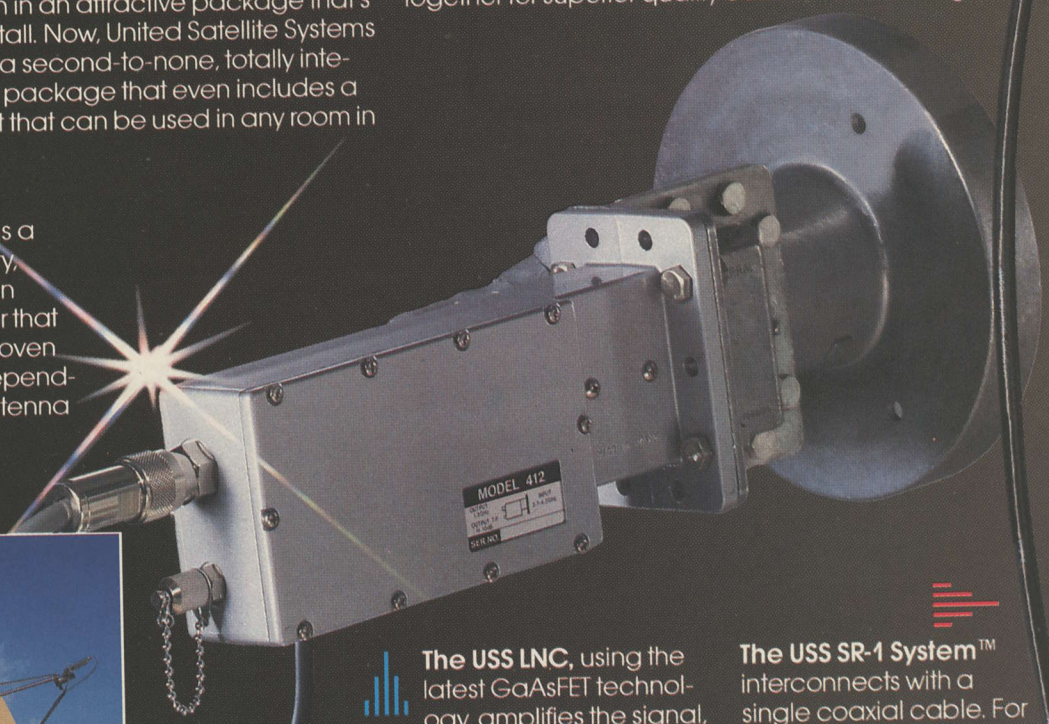
Better By Design

For years, dealers have searched for quality satellite television reception in an attractive package that's EASY to sell and install. Now, United Satellite Systems has the answer. It's a second-to-none, totally integrated electronics package that even includes a remote-control unit that can be used in any room in the house.

Track it through. See for yourself that USS has put it all together for superior quality earth-station viewing.

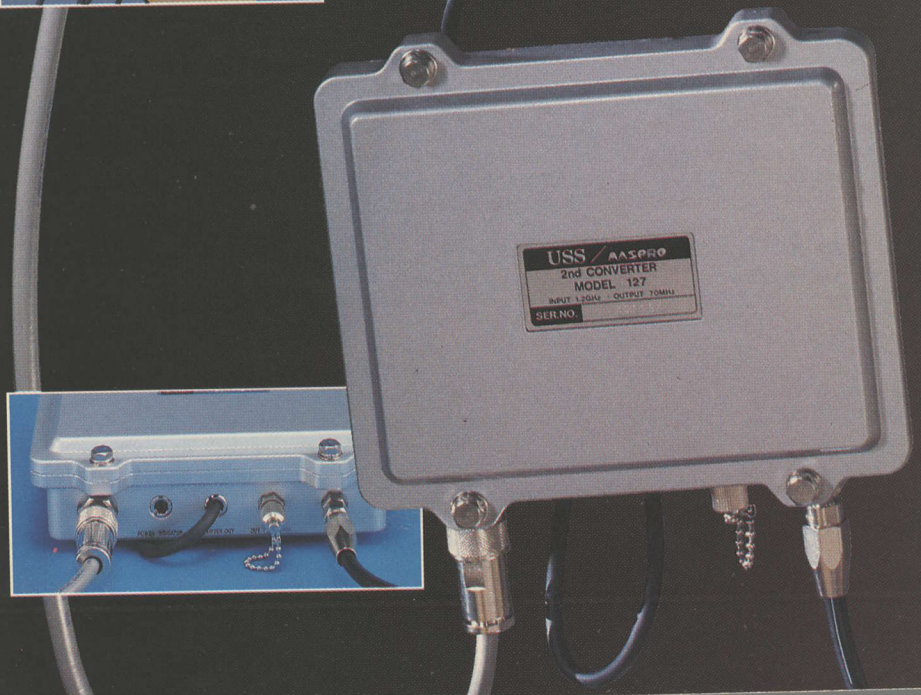
The USS Antenna is a commercial quality, prime-focus design parabolic reflector that was tested and proven superior at an independent microwave antenna test facility.



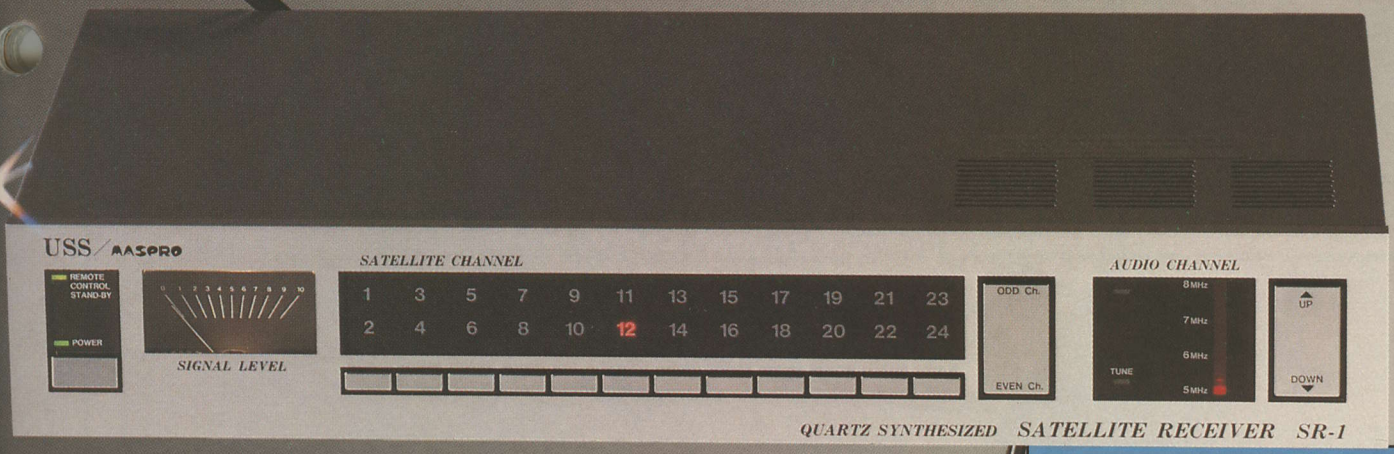


The USS LNC, using the latest GaAsFET technology, amplifies the signal, tunes the transponder, and down converts from 4 Ghz. to 1.2 Ghz.

The USS SR-1 System™ interconnects with a single coaxial cable. For easy installation, we have multiplexed onto one coax cable the IF signal, tuning voltage, and three-wire polarity control, eliminating all excess wires.

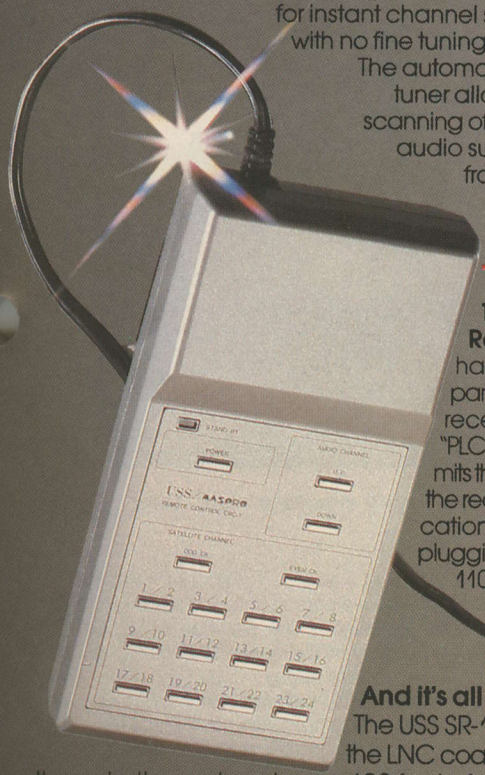


The USS Second Down Converter converts the signal from 1.2 Ghz. to 70 Mhz. It contains the power supply, polarity interface, pilot light and antenna "peaking" test point. It's in a rugged die-cast aluminum, weather-proof, O-ring sealed housing.

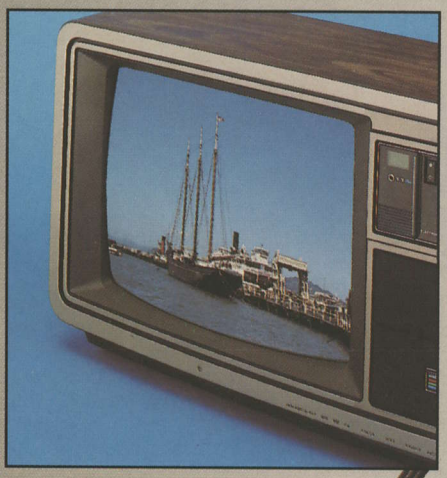


The USS SR-1 Receiver has a soft-touch, push-button, quartz-synthesized encoder for instant channel selection, with no fine tuning needed. The automatic audio tuner allows rapid scanning of all active audio subcarriers from 5 Mhz. to 8 Mhz.

Automatic polarity switching is instantaneous with a push of the button. SAW filter technology is incorporated into both the receiver and modulator. The integral modulator is available on channels three through six.



The USS CRC-1 Remote Control has all the front panel functions of the receiver and, using "PLC" technology, permits the viewer to control the receiver from any location in the house by plugging into the nearest 110 VAC wall outlet.



And it's all in one package. The USS SR-1 System™ includes the LNC coax with connectors, the polarity cord and even 120 feet of cable with connectors for the run into the house. It hooks up quickly; no need to buy additional enclosures, extra wiring or weatherproofing. No special tools required. USS delivers easy installation and trouble-free performance for you... a user friendly system and high-quality reception for your customer.... And it looks good too. A leading publication called it "the most elegantly finished receiver on the market."

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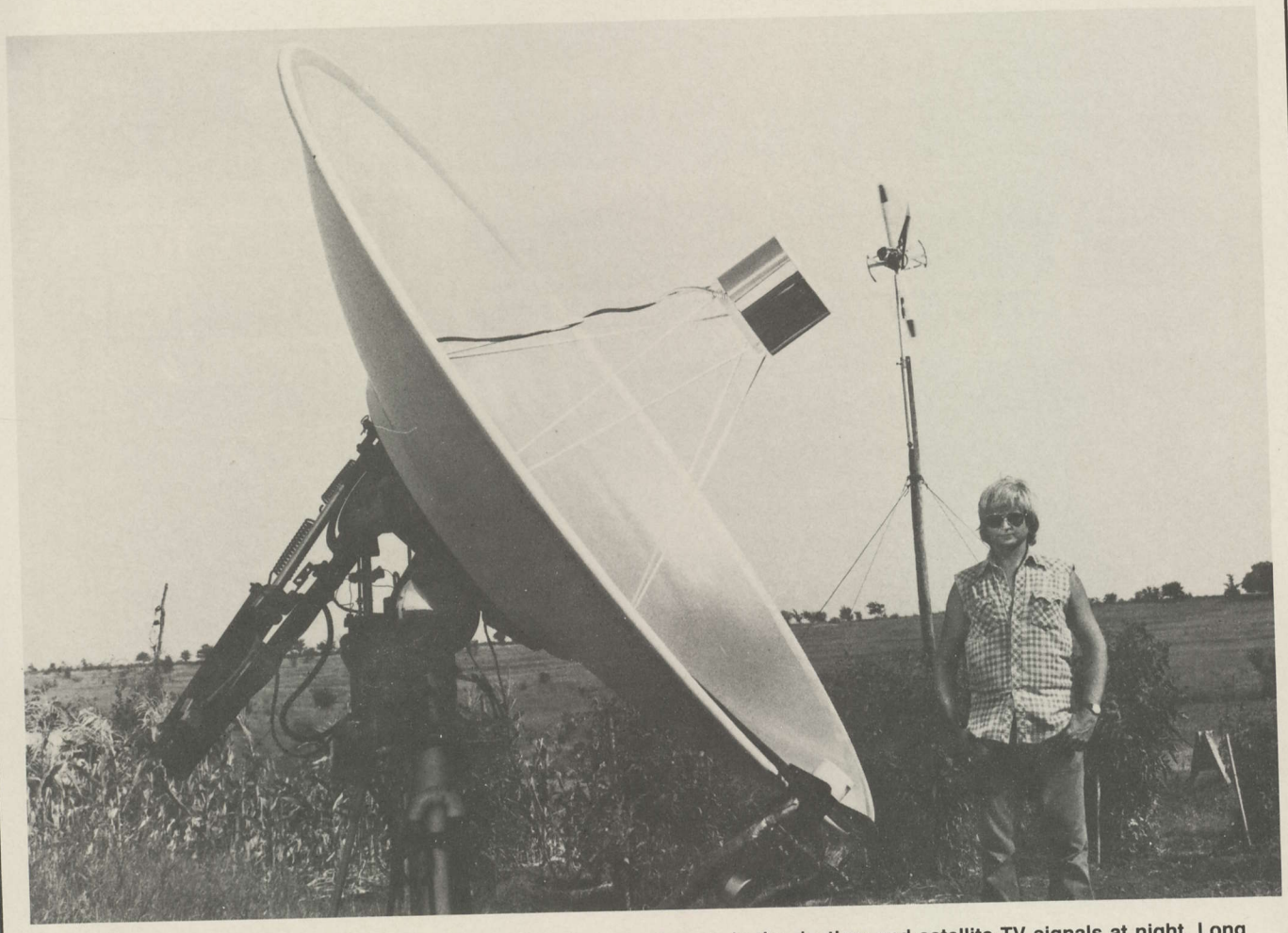
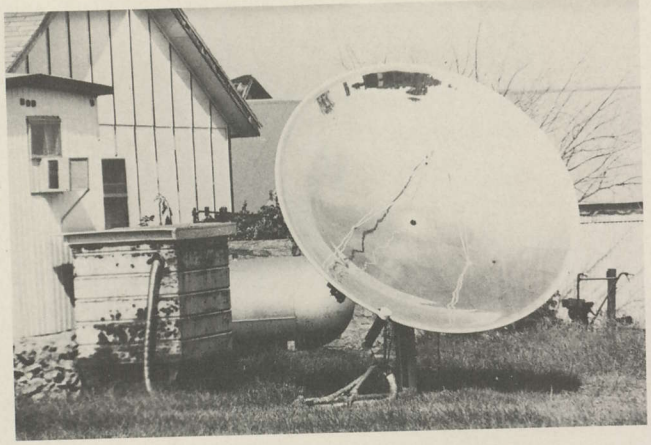


THE HIGHLY REFLECTIVE surface does double duty; focuses the sun in the daytime and satellite TV signals at night. Long afternoon-Sunday football games modify the family's showering cycle!

location where it could be 'smoked' plus the boiler had to be moved 'in' and 'out' to go from TVRO to solar heating. **The answer?** Infrared sensors. Now the unit 'thinks' the sun is shining whether there are clouds or not and if there is a loss of sun light for 30 seconds or more a thermal switch in the line shuts down the circulation to the boiler to prevent heat loss.

Yet another problem was trying to track the daily change of the 'sun/solar belt.' The sun makes quite an annual trek across the sky here in Kansas being below 38° in the winter, and overhead in the summer. **The solution?** A pair of infrared sensors, one located on each side of a 'shade source.' Think of it as a pair of people trying to share an umbrella. When the sun hits one person (infrared sensor) he moves the umbrella more over his head. If the sun hits the other person, the 'umbrella' is moved slightly in the opposite direction so both share in the shade. And everyone is happy.



A fourth problem had to do with human nature. It might not show from the magnitude of the project, but I am basically a lazy person. And those twenty hours spent making the dish surface shine with the 3M material were not all that pleasant. So after twenty or so calls to various dish manufacturers, I found a supplier willing to manufacture 9 and 12 foot polished, stainless steel dishes (petalized for ease of shipment) with a sub-reflector feed f/D of .3.

Which brings me to almost the present point in time. We are in the process of completing a unit for production and sale. It can be used any way the customer wishes; a basic hot water system with steam for evaporating anything from cornmash to impure water. Of greater interest to me as I prepare this, and to most people I have discussed it with, is the use of Freon to make things cool from the hot summer sun. Around this part of Kansas, when the sun shines it is very (very) hot. Thus we are now working with a system that uses Freon as the heated ingredient while at the same time using water as the cooling medium. We are able in one process to heat water for domestic hot water.

Another experiment involves determining the amount of power available for use as a steam type of power for the expansion process of turning Freon from a liquid to a gas. It would be kind of handy to heat, cool, electrify and 'TV' your home with a single dish. And, if we could somehow coach the bugs to fly through the focal point of the dish, you could de-bug your yard as well. **Now, who says there is a zoning ordinance against a bug killing device!**

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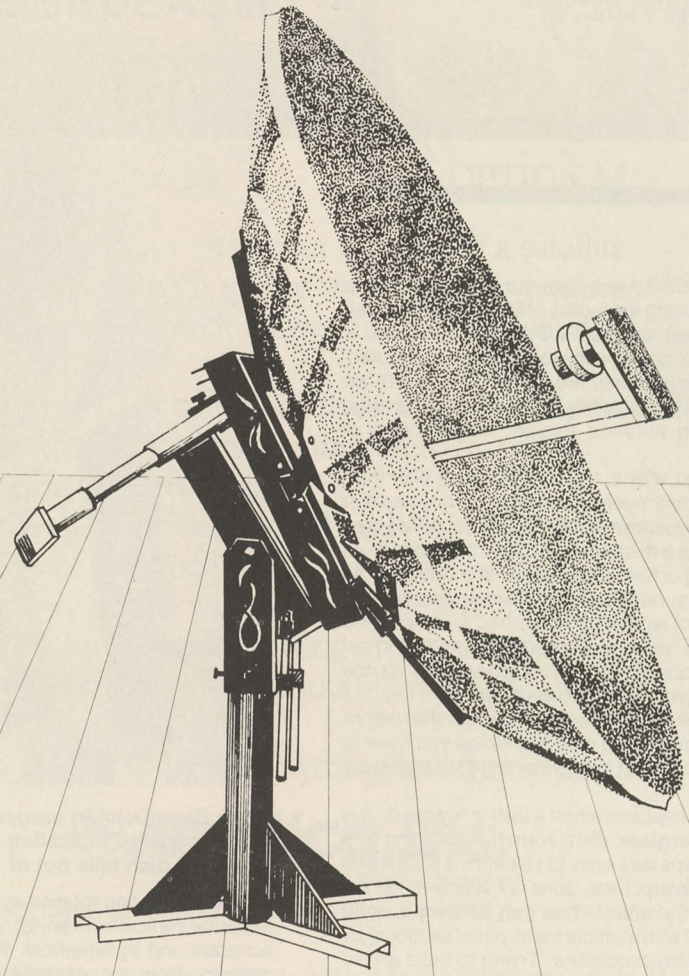

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ANTENNA TEST RANGE

MEASUREMENTS/Part Two

BROKEN Antenna Test

Last month, in the October **CSD,** we bagan our study of antenna test range procedures by introducing the facility of Microwave Specialty Corporation **(*).** While there we saw how a TVRO dish antenna is placed on an antenna 'test range' and how the test range is 'calibrated' before individual antenna measurements are made. This month we will look at some measurements on a specific antenna and try to learn why tests can reveal flaws in antenna design, manufacture or assembly.

The antenna chosen for test was a 10 foot fiberglass dish from **USS.** An experienced person could 'eyeball' the antenna and see that it had a 'lip protrusion' in one quadrant. USS doesn't build warped dishes on purpose; this one was a mistake and rather than toss it out they held onto it to allow us to perform these tests. We selected the USS 10 foot for several reasons, not the least of which was that the same antenna (i.e. same model without a warp) had been proofed several times on this very same range by the same range equipment and engineers. Thus we had on-file the correct polar plots for the antenna and now we would have a new set to compare.

If you read the October issue report you already know that before an antenna can be accurately measured on a test range you have to verify the range itself. We had done that before starting the range tests on the USS 10 footer.

A few words first about what happens when a dish is **'warped.'** It is easy to visualize a warped **fiberglass** dish; somehow warping and fiberglass fit together. It is perhaps less easy to visualize a solid metal or screen mesh dish 'warping.' Warp, here, does not simply mean the antenna has gotten 'wet' and deformed. **You can deform a solid metal dish** (i.e. such as an ADM with multiple metal panel sections) by not following the correct assembly procedure. Trying to build an old style ADM 11 footer, **on the mount,** for example, will almost guarantee you a warp. **A warp,** then, **is** simply **a non-conformity in the parabolic curve.** The dish does not have to be defective, nor do the pieces that make up the dish have to be defective, to have 'warping.' The guys putting it together can cause the warping by not knowing what they are doing, or by doing it in a sloppy manner. Of course the same thing holds true with a screen mesh dish surface as well; improperly assembled and you can and probably will have 'warping.'

A warped dish does not perform like a true dish surface. A warped dish 'distorts' the accuracy of the parabolic surface, throwing some part of the dish closer to the feed than a corresponding and identical part on the opposite or nearby sides. There are some professional antenna designs that purposefully 'warp' the dish, but it is done in a very precise manner and then the feed is modified to take advantage of the warping. That is not the kind of warping we are dealing with here.

A warped dish surface will usually tell you that it is warped, if you know what to look for. One of the most obvious indicators of warping is when you cannot properly separate vertical and horizontal signals

USS's Doug Dehnert exaggerates **the warping problem with our test antenna by indicating** where **on the dish surface the half section of dish falls out of 'true.'**

with a polarization rotation system. Our ability to rotate a control and separate vertical from horizontal depends upon the dish surface being accurate and symmetrical. Warp part of it, and the symmetry disappears. How can you tell? As you set your polarization control for vertical, and having done this tune through the channels, you find a vertical bar (and/or horizontal bars) in some or all of the pictures from the opposite polarity **(*).**

Strangely enough, a dish warped sufficiently to cause a loss of cross pole 'integrity' **may not degrade the gain** of the dish! At least not so much that the dish's reduced performance is obvious.

Dish gain suffers when the warp is spread over a major portion of the surface, throwing perhaps 1/4th or more of the dish out of alignment with the balance of the surface. A warped surface reduces the gain for a pair of related reasons:

1) **Energy collected** by the dish **on the warped portion** of the surface has to travel a shorter (or longer) distance from the reflection point on the surface to the feed on the dish. Shorter or longer than what? Shorter or longer than the same signal striking and reflecting from the un-warped surface.
2) **When the same signal arrives at the feed point** over differing distances, there is a minute difference in the 'phase' of the signals arriving from different points. This difference adds or subtracts signal from the normal signal available. With very unusual circumstances it can 'add' signal; normally the 'phase difference' results in a lower amount of signal getting into the feed. This in effect reduces the overall gain of the dish.

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RC-10 Satellite Receiver System

RDL-10 Satellite Receiver System

3) Finally, a severely warped dish can reflect signals not towards the feed but off in some other undesirable direction; **away from the feed.** In this case the signal never arrives at the feed at all, and thus is totally lost to the overall antenna net gain.

In addition to possible polarization problems and possible signal loss problems, you can also have **'focusing problems'** with a warped dish. The parabola is designed to collect energy from the boresighted object (i.e. the satellite) and concentrate all of that energy at the feedpoint. The feed is also designed to work as a partner to the dish and it has the same type of symmetry as the dish does; a round feed for a round dish. When the dish is warped, you can often notice the warping by playing with the direction the feed points. **A properly formed parabolic antenna** requires that you point the symmetrical feed directly **at the center of the symmetrical dish surface.** If the dish is warped, however, and you have the ability to twist the feed so it points below the center or above the center or right of center or left of center . . . and when you do this you find some location **other than** the center of the dish where the signal strength maximizes, well, that tells you you may have a warped dish **(**)**. If you find two spots where the signal maximizes, and neither of these spots is the center of the center, you have a badly warped dish!

The interesting thing about all of these field tests (polarization separation loss, reduced gain, or off-center focusing) is that **the dish will tell you** it has a problem 'electrically' long before you would spot it visually. It takes a **far smaller** change in the integrity of the dish surface to cause **this** type of performance problem than it does to cause a problem so gross that you can 'see' it with the naked, un-aided eye.

OUR Test Dish

As noted, we selected a 10 foot fiberglass dish. This is a two-piece dish and it had a 'mold problem.' USS's Dehnert explained that either **the panel** with the problem came out of the mold prematurely, and was stored improperly while still 'curing,' or, the section was subjected to some unusual stresses while still in the mold. In any event, when the two half sections were put together it was obvious to Dehnert's eye that they did not match up properly. He over-amplifies the problem in a photo here.

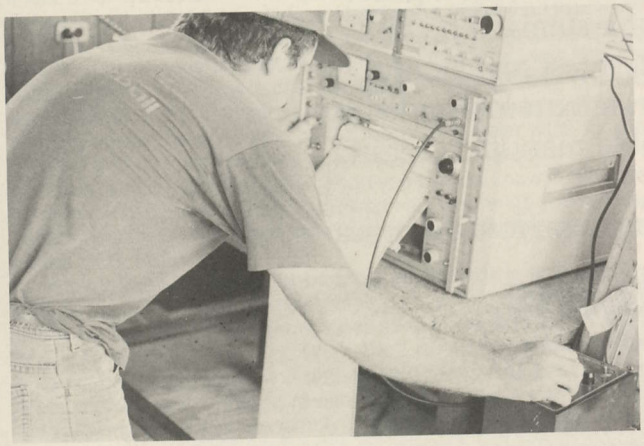
The antenna was placed on the range and carefully fitted with a popular brand of .4 f/D feed (and polarization rotating system). The dish was boresighted on the far-field test range signal and the feed optimized for signal gain.

This particular dish has four points in the rear molded-in support structure where the back of the dish attaches (with large bolts) to the steel box-like frame which holds the dish to the steel frame mount. We had assembled the two halves with as much care as possible, but made no attempt to ream holes or create new ways to force the two mis-matched edges to align. We also made sure that all four of the attachment points, from the dish's rear surface to the steel frame, were properly secured to the frame. We'll come back to that later on.

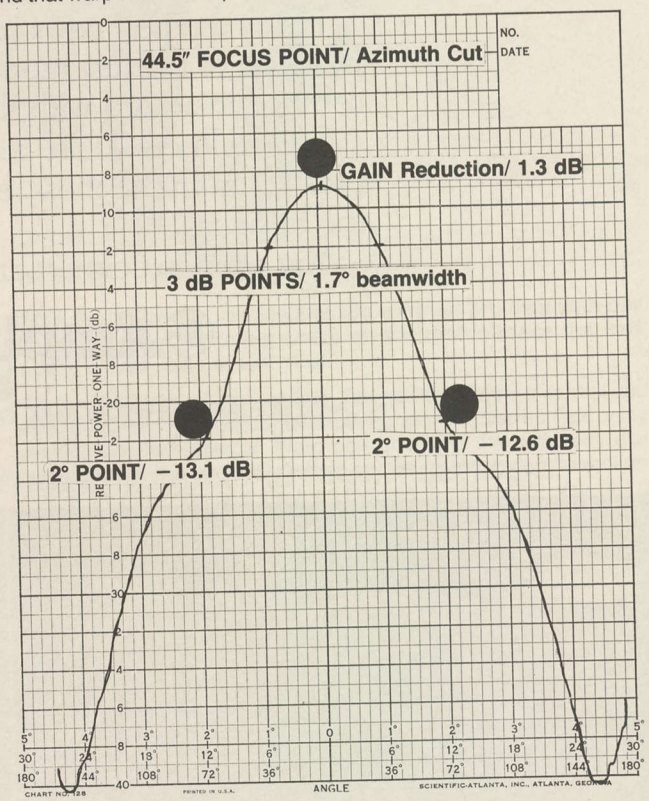
The dish was then measured for gain and for 'pattern.' Both the vertical profile pattern (called the **'H'** plane) and the horizontal profile pattern (called the **'E'** plane) were measured, separately. You do this on a range by deciding rather arbitrarily which part of the dish is 'up' and which is down. This establishes the top and bottom and then you assign the nomenclature of 'H' plane to that up and down profile. The opposite profile remaining (across the dish surface) then becomes the 'E' plane.

Why do you care what is 'up' and what is 'right'?

Remember that a dish obtains its gain because it has a symmetrical surface; a parabolic symmetrical surface. Suppose we had a warp and that warp was in an up and down line on the dish; in the 'H' plane.



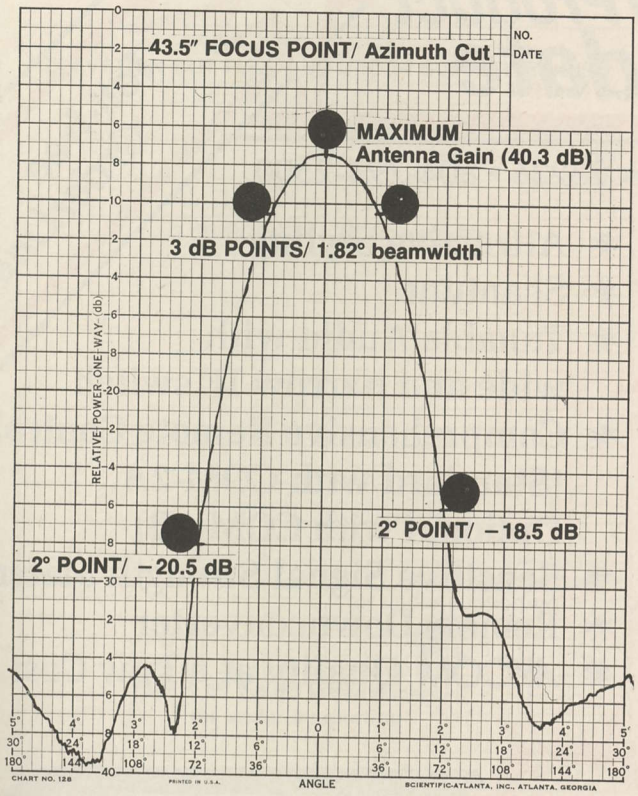
JIMMY YATES operates dish drive controls (right hand) **and 'walks' the antenna through an 'E' plane pole while carefully studying the paper run from the S/A machinery installed at the far field test range.**



WITH FOCAL POINT mis-adjusted on the 'long' side (44.5") **the 3 dB** (or half power) **points on the dish are now 1.7 degrees wide. The 2 degree spacing roll off is now but 13.1 dB on the left side of the azimuth pattern while it reduces to 12.6 dB on the right hand side. Overall dish gain is reduced by 1.3 dB from peak gain at 43.5" focal distance.** Moral? **Mis-adjusting dish focal point feed,** on long side, **results in rapidly reduced gain and severely reduced control on adjacent satellite antenna sidelobes.**

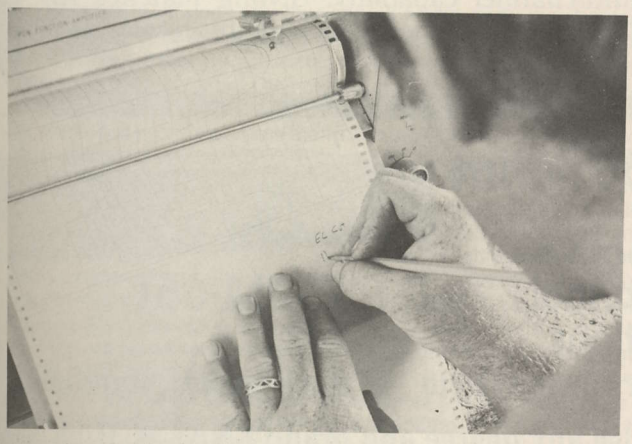
*** — Of course you could also have a lack of cross polarization integrity because the polarization rotation system is not adjusted properly, or is defective. If you cannot decide where the fault is, try swapping out the polarization switching portion of the system at the antenna. If the problem persists, you probably have narrowed it down to the dish surface. If it goes away or even changes substantially, suspect the polarization device.**

**** — You can also find yourself getting maximum signal left/right/up/down of center if your dish is not pointed directly at the satellite. The two problems have an almost identical 'signature.' So before you start waving the feed around and pointing it off of center on the dish, very carefully adjust the elevation and the azimuth controls on the dish to insure you are dead-on the satellite. Being sure of that, then start moving the feed around in slightly skewed directions.**

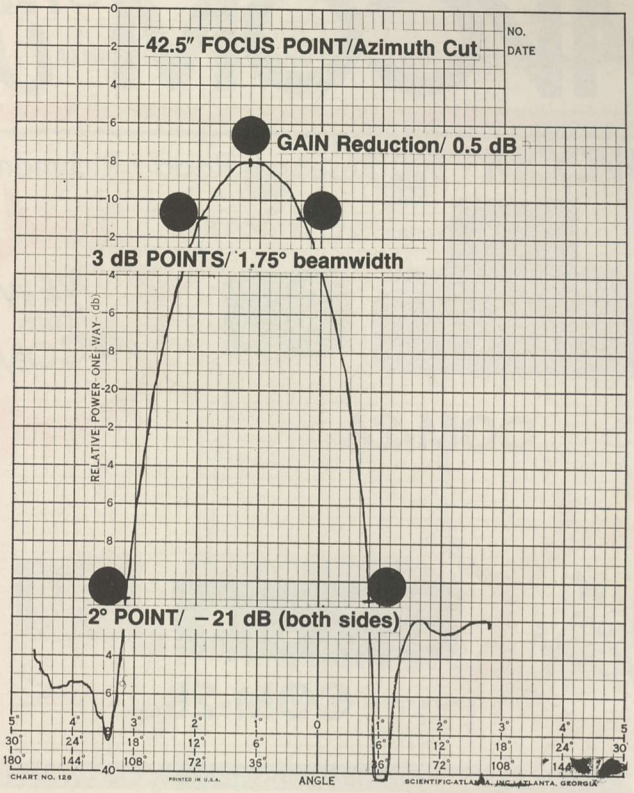


WITH FOCAL LENGTH optimized for maximum antenna gain (40.3 dB or 67% efficiency) **the 3 dB power points** (half power) **are now 1.82 degrees apart. The 2 degree spacing roll off is optimized for this particular antenna with the 2 degree-removed sidelobes down 20.5 dB on the left hand side and 18.5 dB on the right hand side. This is also an azimuth cut pattern.**

A warp could fall from any one starting point to any other ending point. It is possible that if you tested the antenna only in a single plane, such as left to right or in this case the 'E' plane, you could almost 'miss' the warp. It could slip by virtually undetected. But since you arbitrarily selected on your own what part of the dish was up and what part was right, the next guy to assemble and mount that same model of antenna could shift the dish around 90 degrees. And then he might have the same 'warp line' running across the dish horizontally; in the 'E' plane. Depending upon the actual service the dish went into, it could escape



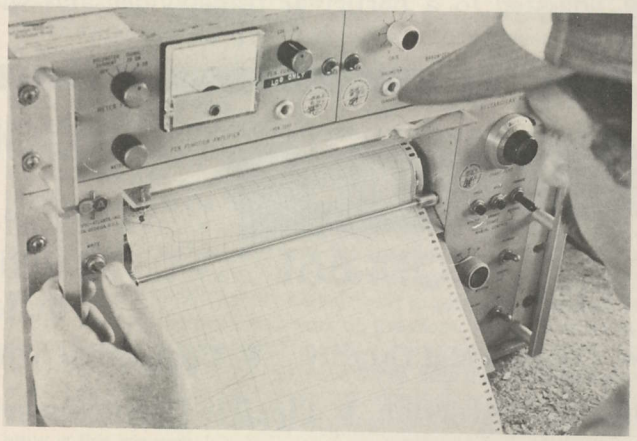
INDIVIDUAL plots are separated on the paper roll by sufficient blank space to allow the antenna test range engineer to record notes concerning the tests. After you have done several dozen 'cuts' **the individual plots all seem to run together!**



WITH FOCAL LENGTH mis-adjusted on the 'short' side (42.5") **the 3 dB** (half power) **points are 1.75 degrees apart. The 2 degree spacing roll off is rather uniform at 21 dB down on** both sides. **The gain reduction is approximately** 1/2 dB **from the optimum 43.5" focal length.** Moral? **You are** safer **being 'close-spaced' with the feed than you are being 'long-spaced'; the reduction in gain is less** (.5 dB versus 1.3 dB for the same 1 inch off-focal-point **long** spacing) **and you may actually improve** (slightly) **the sidelobe control for close-in satellites** (2 degree spacing indicated here) **in the process.**

being a problem in one installation and then become a problem in the next installation. So it is possible to have the problems with warping, and if the installer/user is very lucky, 'overlook' or minimize the damage done by the warping.

A warped antenna could be caused in the manufacturing process; as our test antenna was. It need not be a fiberglass antenna to have a



ANTENNA PLOT appears on graph paper fed from a roll, and is calibrated in gain or loss (left to right) **and degrees** (up and down; **in photo**).

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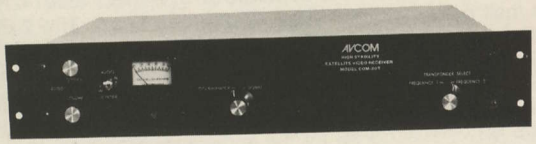

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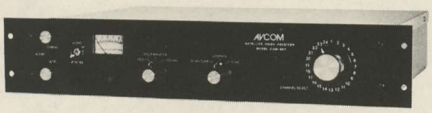

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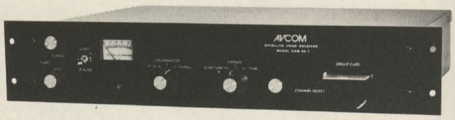

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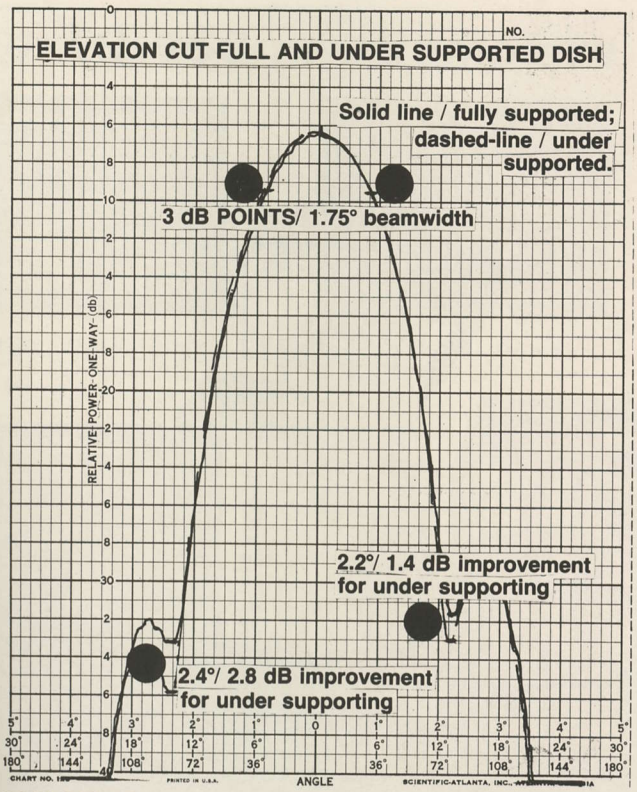
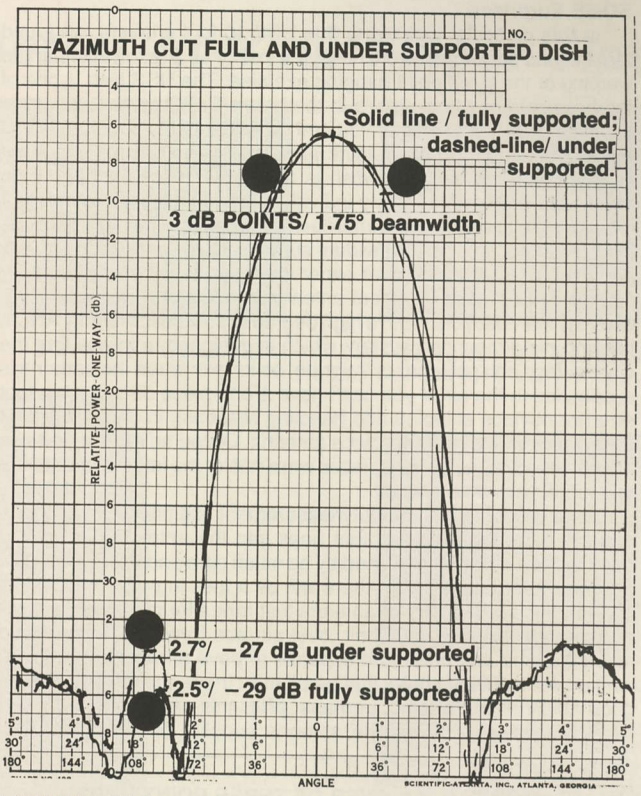


LOOKING AT the under-supported (three mounting points) **dish with the elevation cut versus the same dish with all four mounting points; note that the primary or main lobe pattern remains virtually identical** until **we come to a point that is 2.4 degrees away from the center of the beam on the left hand side and 2.2 degrees away on the right hand side. The three-bolt support actually improves the pattern** (− 26.5 dB versus − 29.3 dB) **on the left hand side and by around 1.4 dB on the right hand side. No, that does** NOT **suggest you should remove a bolt!**



LOOKING AT the under-supported (three mounting points) **dish with the azimuth cut versus the same dish with all four mounting points; note that the primary or main lobe remains virtually identical until we are out approximately 2.5 degrees on the left hand side of the cut. Now our change is that we are − 27 dB at 2.7 degrees with the under supported antenna** (left hand side) **but − 29 dB at 2.5 degrees with the fully supported dish. The sidelobe pattern change is different from the elevation cut; where you** 'gain' **an advantage in one plane** (elevation) **you lose it in the opposite cut** (azimuth).

mold-warp pattern. Metal-petal antennas come out of a 'mold' of a sort; called a 'tool.' The tool is built by humans and while it may have been computer formulated, errors can creep in nonetheless. Screen mesh antennas form on a backing system made up of stamped or preformed metal parts. The 'jig' used for those parts could also be 'warped.'

So when it all goes together and all of the parts are in place, regardless of what the structure and sub-structure may be made of, there is concern that the dish is not totally symmetrical; or, it is warped. So back to the test range. The antenna mounts on a 'table' which lays on its side. The table rotates, on command, and this allows the dish to be tested first in one plane and then in the other. The dish is 'twisted' or 'turned' 90 degrees mechanically by motor rather than being unbolted from the stand and turned over by hand (i.e. shifting the four mounting plate holes on our test antenna so the antenna turns 1/4-turn on its own axis). First you do a 'cut' of the antenna's profile in one plane and then you rotate the antenna 90 degrees on the table and repeat the process again. This has the same effect of leaving the antenna in one mounted position and going left to right (azimuth or E plane) and then up and down (elevation or H plane).

The results come out of the test range plotter as shown here. One set of 'plots' for each plane of the antenna. You could lay one plot over the other and match up the two center points and you would have a rough approximation of the full circular pattern of the dish in both planes. Having dissected the antenna into four more or less equal 90 degree quadrants or sections, you would also have 'cross-cut' the antenna sufficiently that you could be quite sure you have measured funny pattern effects caused by an imperfect dish surface. Or, the effects of having the feed support structure in and about the surface of the antenna, for example.

MAKING The Antenna Less Perfect

Having 'cut' the antenna into four equal sections and having measured the edge-boundary of each side of the four sections with the cross-cut on the antenna, then we brought the antenna back to its original position and studied the out-of-true warp again. We did this with an eye to determining which way, physically, the antenna seemed to have the greatest out-of-parabolic symmetry. And then we did something 'foolish'; we set out to deliberately make the deformity worse than it really was.

Remember that with this dish there are four equally placed attachment points between the dish surface and the rear steel frame mount. We selected, after study, one of those four points to remove the bolts holding the dish to the mount. Now we had a warped dish that **also had** 25% of its surface area unsupported. Think of it as having a clock where the clock surface was nailed to a wall at 12 noon, 3PM, 6PM and 9PM. Now we remove a nail at 12 noon leaving the clock nailed only at 3, 6 and 9PM. That allows the 'wind' to get behind the clock at the 12 noon nailing point and work on the clock; maybe eventually forcing or prying it off the wall. **The dish is our clock.** And with the bolt removed, **the weight** of the dish now **'hung'** from the **two side bolts** and swedged down on the bottom bolt. Hopefully nobody in the field would allow a relatively heavy antenna surface such as this to droop or hang in this manner.

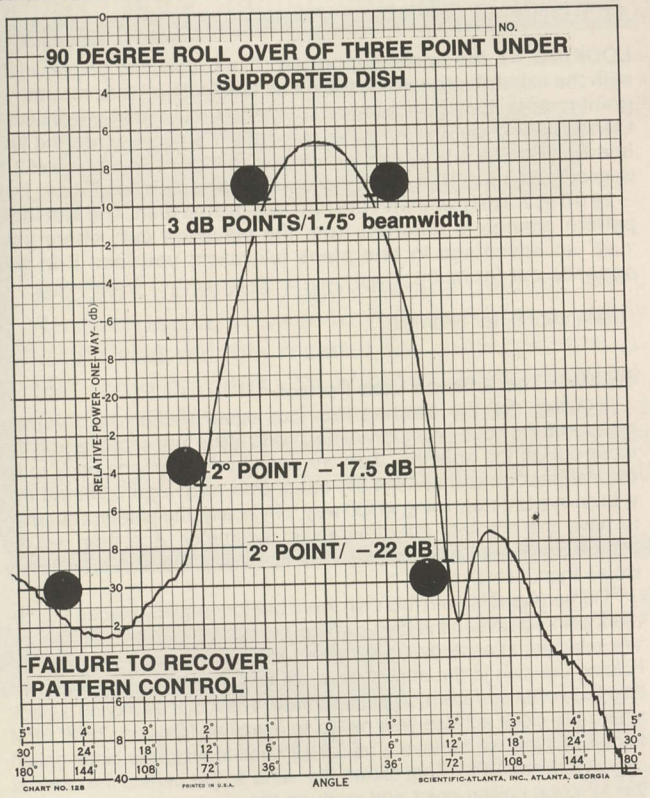
Then we ran the E plane plot again, to see what effect we could measure from a dish that was no longer firmly attached to its four equally spaced anchor points. The plot appears here.

SOME Surprises

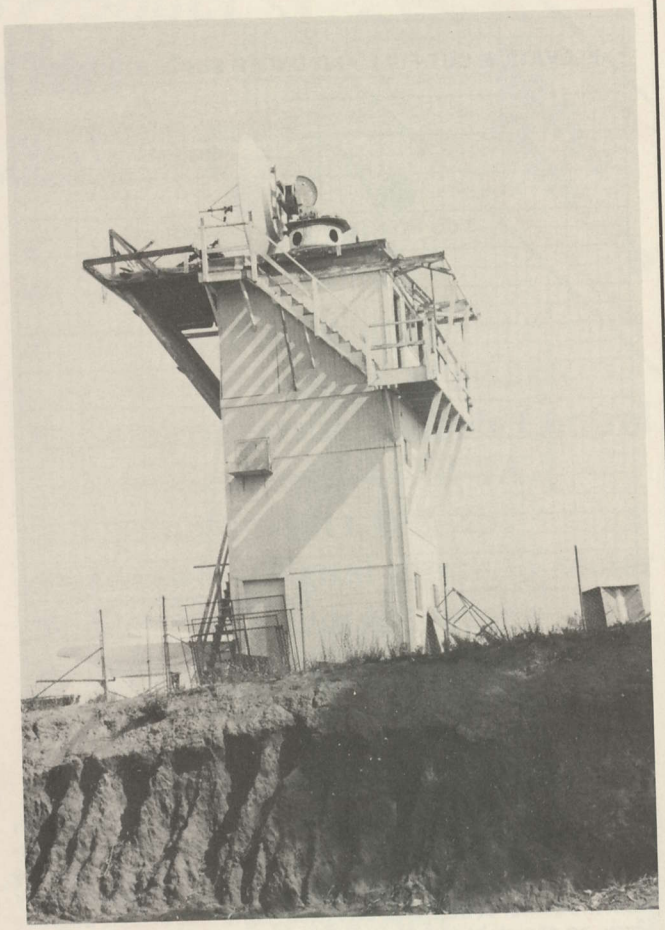
In **this** particular test, using **this** USS 10 foot antenna, we found the antenna performance did not suffer **badly** as a result of either the warping or the three point hanging exercise. The USS dish is one of the heaviest fiberglass dishes in the home TVRO marketplace and because of the dead weight you end up with a beefy structure which even 75% supported still retains almost all of its original important pattern characteristics. The dish is also a two-piece surface which means there are not as many individual (panel) sections to move or migrate when the antenna is improperly supported. The more sections to an antenna, the more individual surfaces to move or slide around, and the greater the impact or either improper assembly or improper mounting. Of course the ideal antenna is still a one piece spun (or carefully stamped) dish with a high degree of parabolic integrity AND a backing plate/mounting system which is designed to insure that the dish surface can not warp or 'migrate' on its own when the antenna is suspended in the air. If you can't have a one piece dish in a ten foot size (for obvious shipping and handling reasons), in theory the next best choice would be a two-piece antenna. Of course if the two pieces are not identical, as our two pieces were not for the imperfect antenna tested, then all bets are off!

What you learn in a careful measurement exercise such as this is that the care and precision that goes into the antenna design and manufacture **must be matched** by as much care and precision **in the antenna's installation;** or, there will be a loss in performance.

Antennas brought to an antenna test range for measurement will normally be installed with their 'best surface forward.' Anyone who takes the time and effort and expense to have an antenna proofed/verified will want the charts that result from the range testing to be as good as possible. Missing, perhaps, **after** this exercise is a full and careful documentation by the antenna supplier of what **he did** to



ROLLING the warped plus under-supported dish 90 degrees, so the unsupported side is now on one side **rather than on the top, the 2 degree offset is now down −17.5 dB on the left hand side and down −22 dB on the right hand side.** However, **note the quick recovery of the sidelobes on the left hand side and the** failure **of the pattern to** drop off **into the 'noise'; a combination of the warping and the under supporting of the dish has distorted the pattern.**



RANGE HOUSE is elevated platform with sophisticated turntable platform on top; measurements and analysis is done in top floor 'room' directly below the antenna and turntable.

insure that the antennas going into the field are capable of the same performance as was measured on the range. A really 'perfect' antenna is not one that exhibits the highest gain (and tightest pattern) **on a test range;** unless it is designed in such a way that the average dealer installing that same model antenna **in the field** can obtain the **same results** when he field-assembles the surface and mount and feed at a customer's home. More careful dealer-attention to what makes an antenna good, everytime, in the field, will help insure that the antenna portion of our technology keeps pace with the rapid strides being made monthly with our electronics.

NEXT/ Looking At The Feeds

Subsequent to the preparation of this report, but prior to your reading the report results here, **CSD** traveled back to San Diego to engage in a second round of tests at Microwave Specialty Corporation. This time we brought along several of the more popular industry feeds and we did two days of testing on the feeds.

On day one we placed the individual **feeds** on an antenna test range designed for feed evaluation. Each feed was measured for pattern, gain (or loss), and an indication of its ability to funnel the microwave signals captured by the feed down into the LNA 'throat.'

On day two we took three of those feeds and placed them one by one on a known five meter size 'surface.' Then we optimized the gain of the feeds with the dish surface and made our pattern 'cuts' in both the E and H planes.

From all of this we then had a set of numbers relating to the real world performance of the feeds; a same antenna, same antenna test range, side by side comparison set of numbers.

Is one feed really better than the others? Are there losses in the feeds when they have weathered? We'll look into all of this in **CSD.**

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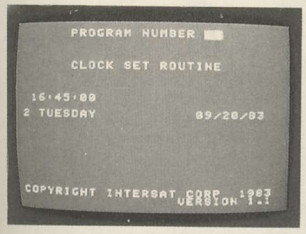
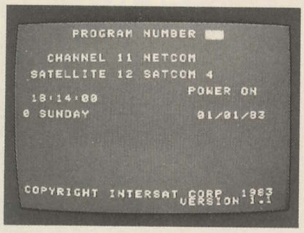
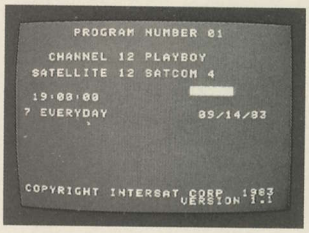


Set Day, Date, Time

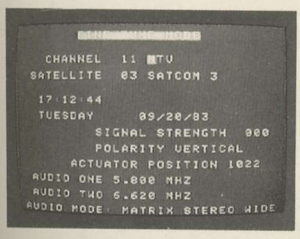


Selects Lockout, Power On, Power Off



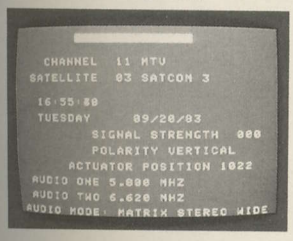
Parental Lockout

Channel #, Satellite, Day, Date, Time

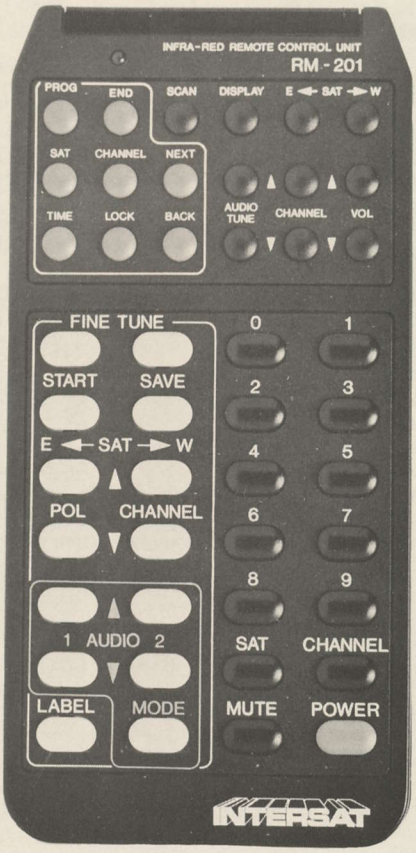


Label Change, Satellite Location, Fine Tunes Audio

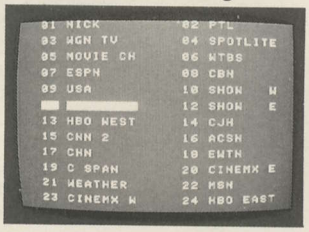
Stores All Changes In Program



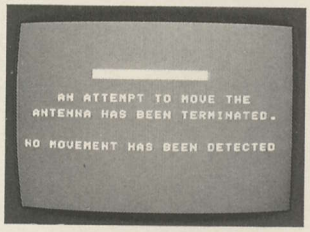
8 Modes of Audio/Tunable 12 Watts Stereo



Available Satellites for Viewing



Available Channels On Each Satellite



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FIRST Details Revealed

As we approach the **Orlando SPACE '83 Show** (November 3-5) more and more of the important details relating to the to-be-announced (in Orlando) **Satellite Financial Planning Corporation** $750,000,000 consumer loan program become available. For those who are reading this prior to Orlando (or at Orlando), this will give you a 'leg up' on those details and allow you to better evaluate your own possible participation in the program. For those who are missing Orlando, here you should find most of the important information and on Tuesday, November 8th you can stand in line on the telephone to talk with the people at SFPC about the program yourself.

The fact that there would be a $750,000,000 major-bank funded national (plus Canada) consumer financing program for home TVRO terminals was discussed in **CSD** last month. Some additional details came out in our October issue of **CJR** (Cooper James Report). Much of what follows may fly right by the chap who spends more time worrying about making dish systems work than marketing systems effectively, but even the technical type readers should try to have a basic understanding of how this program is apt to change the face of our industry over the next 12 months or so.

FIRST Date

Just in case you have gotten your hands on this issue of **CSD** prior to the 8th of November, please be advised that the first effective date of this program is the 8th. That's the Tuesday **after** the SPACE show. If you want to talk with SFPC people concerning this program **prior to** the 8th, you had better do it in Orlando between the 3rd and 5th.

FIRST Highlights

A total of $750,000,000 is being provided to the program by the **First National Bank of Wilmington, Delaware.** This is a national plan (all 48 continental states and Canada). The individual TVRO dealer will be able to offer TVRO systems to consumers with as little as **no** money down and with as long to repay the loan as 72 months.

There will be 24 hour credit approval in most instances (some will be within hours). The system makes use of an 800 toll free number and the dealer will simply telephone in certain relevant information concerning the sale (dollar total) and his customer (name, address, Social Security number for identification); and himself (dealer name, address, telephone number and an SFPC "ID" number).

The repayment terms are bank-described as 'flexible,' up to 72 months as noted. We'll look at that more closely shortly.

The interest rate will fluctuate with the prime interest rate. It will start out at 16.9% APR which is considerable lower than most **consumer** level financing available today.

In addition to the financing plan, through a separate but related company **(Satellite Earth Station Protection Company, Inc.)** the dealer will also be offering an initial-term three year 'Extended Limited Warranty' (and protection plan). And, there will be a CASH bonus incentive for the dealer who is able to 'sell' both the financing package AND the extended warranty packages. How much of a cash bonus? $200 in cash bonus. We'll come back to that, also, shortly.

SFPC/SESPC QUICK REFERENCES

1) **Telephone numbers:** 1-800-932-DISH within 48 states; 1-301-964-1990 (964-1991) in Canada.
2) **Operating hours:** 9AM to 8:30 PM (ET) Monday through Saturday.
3) **Terms:** No money down, up to 72 months to repay.
4) **Dealer** Bonus: Up to $200 per system sold (see text).

REVOLUTIONARY Package

As related in the October **CSD,** when this whole concept first came up last spring, the goal was to create a national consumer protection program which would get the dealer off the hot seat when a consumer's TVRO system failed or otherwise proved unsatisfactory; and the dealer could show he was not responsible for the problems.

As the program was studied and studied some more the 'lead portion' of the package switched from the extended warranty portion to a national financing package. At that point it appeared that if somehow there could be a national financing package put together, just getting a package which was national in scope and simple to administer in operation would be a praiseworthy accomplishment.

Often, in a first-time situation like this the people loaning the money are short enough on confidence in a new industry such as this that they go for maximum self-protection, and create terms and conditions which are not terribly appealing to the end user. The money lenders figure that **lacking any other financing choice,** the consumers will have **no choice** but to agree to their terms.

Well, that is hardly the case with SFPC. They have attempted to create a money program which will be so strong that no other 'money loaning competitor' is apt to come along in six months or 18 months with a program that is **better** for the consumer. There are some very unusual 'wrinkles' to the SFPC plan, which perhaps only the financial people in the crowd will appreciate as 'innovative' and unusual in a consumer financing program.

Number one / Flex Payments. Let's say the consumer decides he wants to pay back the TVRO loan in 36 months and that his bank payment each month is $130. But someplace along the way the consumer gets into a money bind and he finds that $130 a month is taxing on the budget. No problem. He simply writes on his bank billing statement that he wishes to change the term of the loan (to 72 months, let's say), and immediately his bank repayment for the TVRO system is cut down. That is all there is to it! Or, let's say the TVRO consumer is really strapped for cash after the system goes in and he doesn't want to default on the loan and lose his TVRO. No problem; he can pay as little as 2% per month on the outstanding principal and everyone will be happy.

This is as 'revolutionary' in consumer financing as a 40 degree LNA would be for the TVRO field. SFPC's **Bill Young** really worked on this one to make it possible and the corporate money managers in the crowd can appreciate how much work it took to bring it off. The history of this might interest you.

You may recall, back about 20 years or so ago, people were losing

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their homes because they could not make the full mortgage payments. Under the then-existing banking laws, if the home owner did not meet his monthly mortgage payments, **the loan was in default.** This was happening so often that the Federal Banking Commission studied the problem and came up with some new regulations which prohibited banks from grabbing people's houses when the home owner fell upon hard times. In effect, the banks could no longer insist on the full monthly payment and as long as the home owner could make some sort of minimum payment each month, he was able to keep his home and not be in default on the loan.

This did two things for the money industry, creating something which the bankers now refer to as 'Flex Payments':

1) **The borrower could pay a lot less** than the full monthly amount and NOT lose financial credibility, and;
2) **The bank at the same time** was able to maintain their own 'cash flow' to insure that they could meet the needs of their depositors by still paying the interest they promised on savings and CDs.

Number two / No mortgage. Normally when a bank loans big money such as this, the bank wants to have the borrower tied up seven ways **to** Sunday and four more **on** Sunday. Young's SFPC has been able to structure the loan program so that the consumer is **not signing** a mortgage agreement nor is the consumer preparing a collateral agreement.

Now there **are** other financing programs that offer the same kind of advantages to the consumer, but they make it up on the seller of the equipment. The money lenders insist that the guy **selling** the equipment or car or whatever **stand behind** the sale and guarantee the payback. Obviously this merely shifts the burden for financial responsibility from the buyer back to the seller, and the seller has to carry every sale he makes on his books as a 'contingent liability'; for as long as the loan is still unpaid. Not here. Neither the seller **nor** the buyer are stuck with this. Very unusual.

EXTENDED WARRANTY Protection

If the folks at SFPC and the First National Bank of Wilmington, Delaware are not going to tie up either the seller **or** the buyer, how is there protection for those loaning the money, and at the opposite end, for the consumer who is buying the equipment?

The money package is tied to the extended warranty package. At the outset, at least, the dealer who offers a package installed at a home with financing must **also offer** the extended warranty program as well. The money lenders consider the warranty portion of the package as **their** 'protection' since it insures that the package will operate properly for no less than three years.

Under this portion of the plan, the consumer is guaranteed that the terminal system purchased will be fully protected against virtually everything that might otherwise shut it down for 36 months. The warranty portion will also be renewable, we are told, beyond three years. The warranty package is 'insured' by a large, multi-national US insurance company; **Reliance Insurance Company.**

There are but **five exclusions** to the full protection offered by the warranty plan. They are:

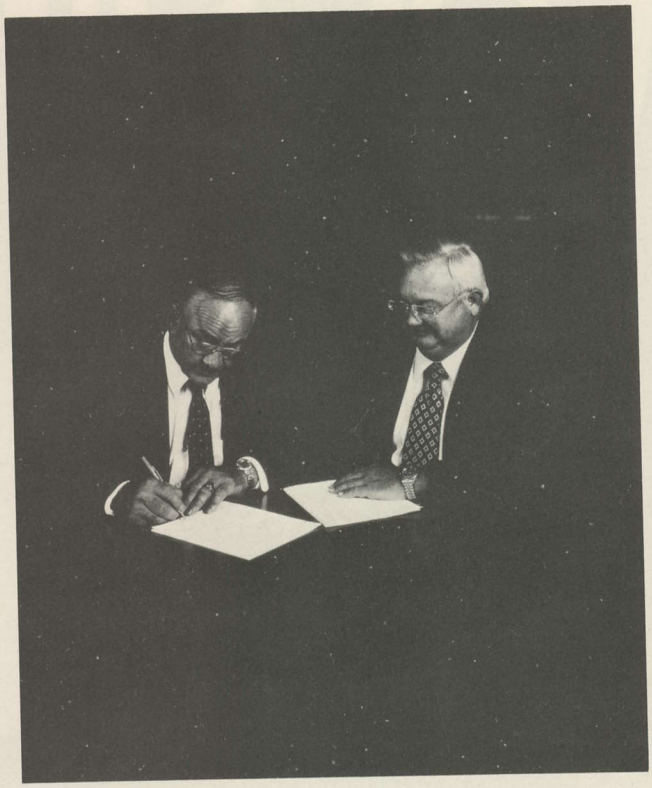
1) Normal wear and tear,
2) Flood losses,
3) Intentional damage (i.e. malicious),
4) Current or future legislation or ordinances,
5) Loss of earnings.

Again, this appears to be a very broad and very **complete** package since getting **totally complete** mass coverage for a consumer type of product is impossible (there are simply too many risks out there). Bill Young feels this is the **"most comprehensive program that ANY industry has ever received."** He may well be right.

Finally, remember that the dealer receives a special 'cash bonus' for signing up a consumer to the financing program AND the extended warranty program; as much as $200 (a function, we understand, of system value).

Let's talk about that just a minute. Two hundred dollars.

Let us assume that the dealer has a net profit of $600 on a $3000 sale, after paying all of his equipment cost, installation costs, office costs and selling costs. Now he gets the system financed and the customer has the extended warranty program. The dealer gets a check ('cash bonus') of $200 for making the whole system package work together. His $600 profit just became an $800 profit! And that is, as Young points out, a substantial 'bonus-profit' just for completing some sets of papers. Of course if it was the **availability** of the no money down/72 months to pay consumer financing plan that allowed the dealer to **sell** the system **in the first place,** it is a little bit like having your cake and eating it too!



JOSEPH GAMMON (President, First National Bank of Wilmington, Delaware), **left, and Bill Young** (Satellite Financial Planning Corporation) **inspect some of the paperwork required to get the $750,000,000 loan fund established for the home TVRO industry.**

PERCENTAGE of Turn Downs

The dealer will call in the information to SFPC. The call is an 800 number cost-free call (**1-800-932-DISH;** in Canada **1-301-964-1990** or 964-1991). After the information is turned into the SFPC personnel, it goes immediately into a national credit network where computers bring up to the loan approval officer all of the relevant data concerning the loan applicant. Now, what percentage of the consumer applicants will be approved?

This may be the most difficult thing for the dealer to handle, especially if he has no prior experience with loan processing for consumers. The theory is that the buyers will be home owners (i.e. permanent people buying a home with mortgage payments). As a group, home owners have about the best credit ratings in the country. But **individually,** they may well be terribly over extended. That means that **some percentage** of the applicants will NOT be approved for the loan. The question is 'what percentage?'.

Nobody really knows, today. It may well be the end of the first quarter for 1984 before SFPC and The First National Bank of Wilmington know, for sure. There are some guidelines, however. The worst case first.

The national average for acceptance for ALL loans which are **not** mortgage type loans is **55%.** That means that slightly fewer than half of those who apply are turned down. **That's the bad news** and it is perhaps not so bad as it seems. **Why?** Well, when you take ALL

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SFPC/SESPC SIX LOAN STEPS

#1) **Dealer calls** 1-800-932-DISH for consumer credit approval. Provides information required over the telephone.

#2) **Satellite Financial Planning Corp.** will notify dealer, by telephone, in most cases within 24 hours, with credit approval (or dis-approval).

#3) **Dealer notifies consumer** of credit approval and goes over the details of the loan.
- A) **Down payment** flexible, from $0 to anything the consumer wishes to put down.
- B) **Flexible payment** plan; 24, 36, 48, 60 or 72 months. During the payback period the consumer may elect to change **between** these terms **without penalty.** Minimum monthly payment as low as 2% of outstanding principal.
- C) **The consumer** will receive monthly statements directly from the bank.
- D) **Covering the system** is a three year warranty and protection policy. The cost is $.50 per day.
- E) **A check** from the bank will be mailed **directly to the dealer,** and the extended warranty protection plan will be mailed **directly to the consumer** from Satellite Earth Station Protection Company, Inc.

#4) **The dealer proceeds** with the final sales agreement and then the installation of the TVRO. Paperwork completed includes the financing contract, a work sheet, the dealer's sale contract and the application for the extended warranty and protection plan.

#5) **The dealer mails** the following to Satellite Financial Planning Corporation; signed finance contract, work sheet, two copies for application for extended warranty and protection plan, copy of the dealer's sales contract signed by the dealer and the consumer.
- A) **Within one day** of receipt, the bank will mail the check directly to the dealer for the consumer's purchase. The check will be made out to the dealer and the consumer (the consumer co-signs the check indicating final approval of the system).

#6) **Satellite Financial Planning Corporation** will send a check (up to $200) to the dealer; this is the fee or bonus paid to the dealer for completing the extended warranty and financing package.

consumer loans, as a category, you are including loan applicants who come from all walks of life. That would include non-homeowners (apartment dwellers, for example), young people who are just starting with their first jobs (and have no credit history), and so on.

Now the better case. If you separate out just those people who own their homes (i.e. are making mortgage payments), and you further refine it to people in this category who make applications for 'home entertainment equipment financing,' you find that between 10 and 20% of those making loan applications are refused. In other words, someplace between 8 and 9 out of every 10 who apply **are approved.**

Individual dealers can probably start off using 8 approvals out of ten applicants as a guideline. The **smart dealer** will watch his own non-approvals over the first few months and try to determine just **what it was** about the people who made the application which caused the loan application to be turned down. When he figures this out with some skill, he can then modify his own sales approach policy and perhaps begin to do his own pre-screening of applicants by asking them key questions on his own. That could, of course, be risky since the dealer is assuming the position of being a preliminary loan approval officer and just when he thinks he has it figured out he may find he is missing some good sales by screening out the wrong people!

SUMMARY

With this updated report there is some important supplemental information which abbreviates the data the dealer needs to concentrate on in evaluating the program. If you are in or going to Orlando's SPACE show, you can discuss the plan with the people from SFPC there. If not, you have access to the program starting at 9AM (ET) Tuesday, November 8th.

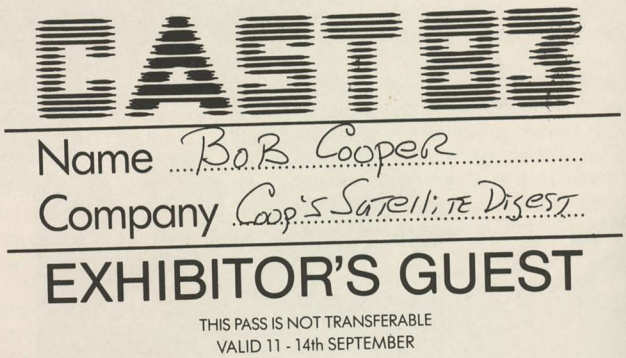
WHAT IT WAS LIKE AT CAST '83/

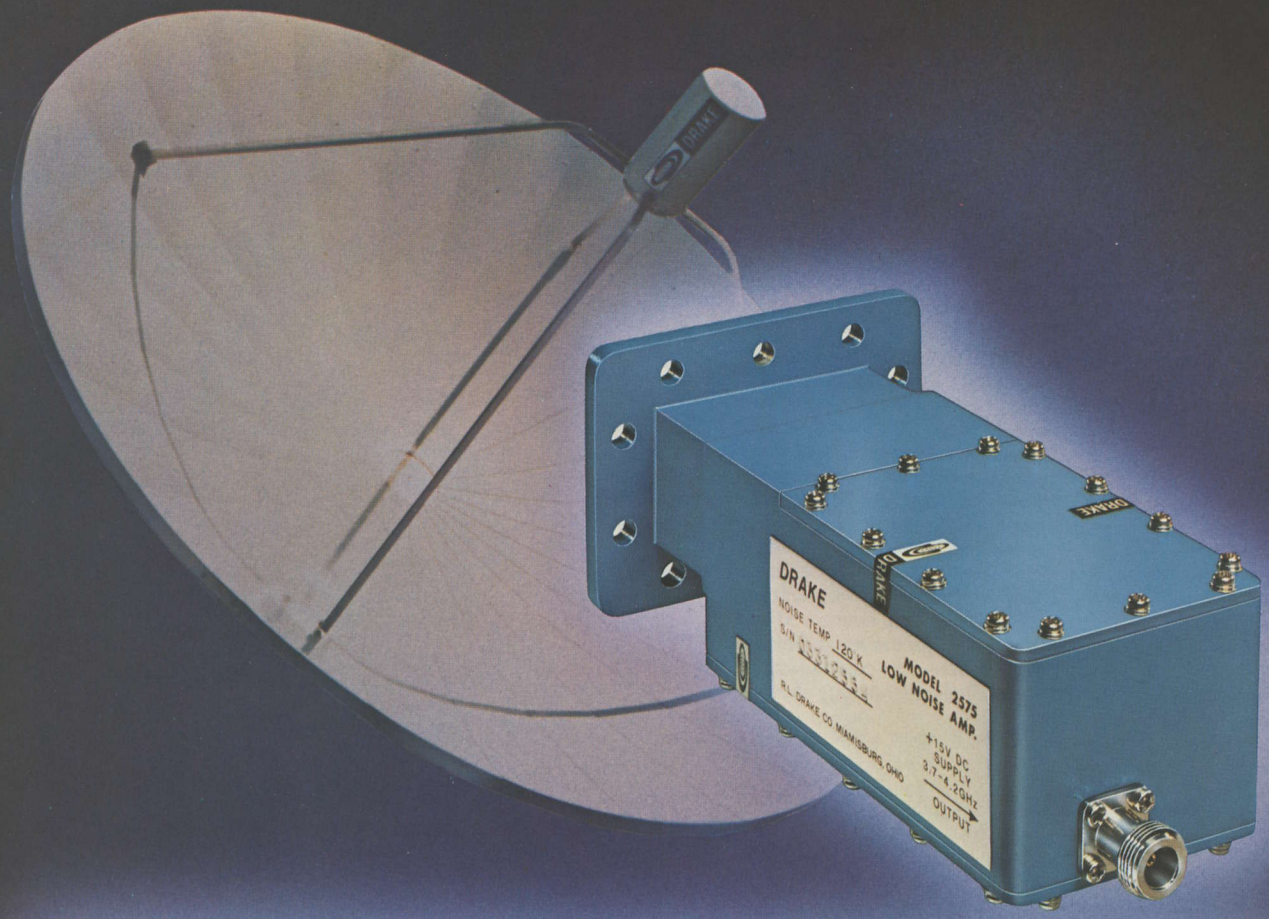
THE YANKS ARE not COMING

CAST '83; billed as the first European satellite show, **then** billed as the first European cable show, and **then** finally rebilled a third time as the first joint cable-satellite show. Attracting perhaps a few thousand curious and technical and money investing types who wanted to be a part of the great communications boom in Europe, they traveled to wet and chilly Brimingham in the English mid-lands in the middle of September.

The concept was this. Cable television is catching fire in Europe. Belgium, Switzerland and a handful of other countries have had multiple channel cable service for years. But most of Europe has no cable, other than the apartment house and block by block MATV systems which proliferate. England has perhaps ten percent of its homes connected to cable, but the systems are more similar to the in-town apartment MATV systems of the states and Canada than the

ENGLAND SHOW REPORT





THE VITAL LINK

LOW NOISE AMPLIFIER FROM DRAKE

The Low Noise Amplifier (LNA) is the vital link in your satellite earth station, and is often required to tolerate the most demanding environmental conditions. The LNA is probably the most electrically-sensitive component in your system. This means you should take exceptional care in selecting the LNA which will maintain the high performance standards you demand.

Drake LNAs feature an integral bandpass filter and ferrite isolator to reject interfering signals and provide maximum efficiency. Each Drake LNA is tested to assure greater than 50db signal amplification under all operating conditions. Conservative noise temperature measurements assure you of a LNA which meets its specifications on all satellite transponder frequencies.

Drake LNAs are environmentally engineered to withstand the elements. Every Drake LNA is supplied with an individual performance report of noise temperature and gain parameters. Most of all, Drake LNAs are built with traditional Drake quality and backed with Drake's famous customer support.

Drake LNAs are available in three models to complement your antenna selection, signal strength footprint, and receiver requirements.

R.L. DRAKE LOW NOISE AMPLIFIERS

MODEL NUMBER	WORST CASE NOISE TEMPERATURE	GAIN (nominal)
2575	101 to 120 degree K	52db
2574	86 to 100 degree K	52db
2573	85 degree K or better	52db

Chances are you'll specify a Drake satellite receiver, too! We're dedicated to making your earth station picture sharp and clear. The R.L. Drake Company has produced quality communications products for more than forty years. Demand a Drake!

See your local Drake dealer or contact us for further information.

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PIONEER MEMBER OF SPACE

full blown cable we expect here in North America. And the sad part; most if indeed not all of the MATV systems were designed in such a way that there is no capacity remaining to add additional channels. The systems in England, Denmark, Sweden and elsewhere (with the possible exception of Switzerland and Belgium) were designed to carry just the number of locally available off air-channels; seldom more than four channels simultaneously.

The public and private attitudes concerning cable distribution are changing; fast. Under newly proposed legislation, most English homes will have access to 30 channel cable systems within a decade. Many will be two-way systems and they will be as modern as any in North America, excepting perhaps for their channel capacity. And once a country has accepted the cable concept, well, then their eyes and ears turn towards how you fill up these modern cable systems with programming that viewers will be willing to pay money to receive. Those eyes and ears eventually end up pointing up and south; towards the equator. 'Satellites' are obviously the answer.

CAST '83 attempted to cash in on the intense new interest in both cable and satellites. Since both are new working technologies for the average investor and engineer in Europe, there was obviously much to be learned. CAST '83 was a private show venture, sponsored by a group that makes its living putting on shows all over the world. Unfortunately, it had no real expertise nor experience in communication systems and to those who have attended similar technology shows in North America, it showed.

The facility was impressive; the National Exhibition Centre, built at considerable government expense for just such a purpose is a **massive** trade show center. The complex could have easily handled 50,000 people and a thousand exhibits. It dwarfs anything the USA has to offer.

There were approximately 100 exhibiting companies. Perhaps 15 of these firms had in their exhibit area anything dealing with the satellite service. Others ran the gamut from cable amplifiers to a couple of European versions of 'MTV.' Thus in one gathering you had cable design firms, cable hardware suppliers, terrestrial microwave suppliers, satellite microwave equipment suppliers, programming services, government agencies who function like private firms in the US, and people selling television sets. It was quite a mixture.

Our focus will be on the **satellite portion** of CAST '83. And more particularly, whether or not there is today (and will be one day) a TVRO marketplace in Europe. Let's start with the present.

Rumor of the show: "An American 4 GHz satellite (no specific satellite mentioned) will, as it is retired from use for North America, be taken through the orbit belt and placed in a location near the Prime Meridian (0 degrees). There, it will be used as a temporary 4 GHz service bird for Europe." **There is no credence to that story at all,** of course. Overlooking that when an American bird is retired it is only for the best of reasons (no maneuvering fuel left or a major portion of its transponder capacity has quit), we come dead against the problems which today make Europe a non-private-TVRO market. Politics.

Those few firms focusing on 4 GHz have clearly identified the major problem with creating a TVRO market in Europe today. And that is?

"It is bloody simple," said the Englishman. **"There is virtually nothing to watch up there"!**

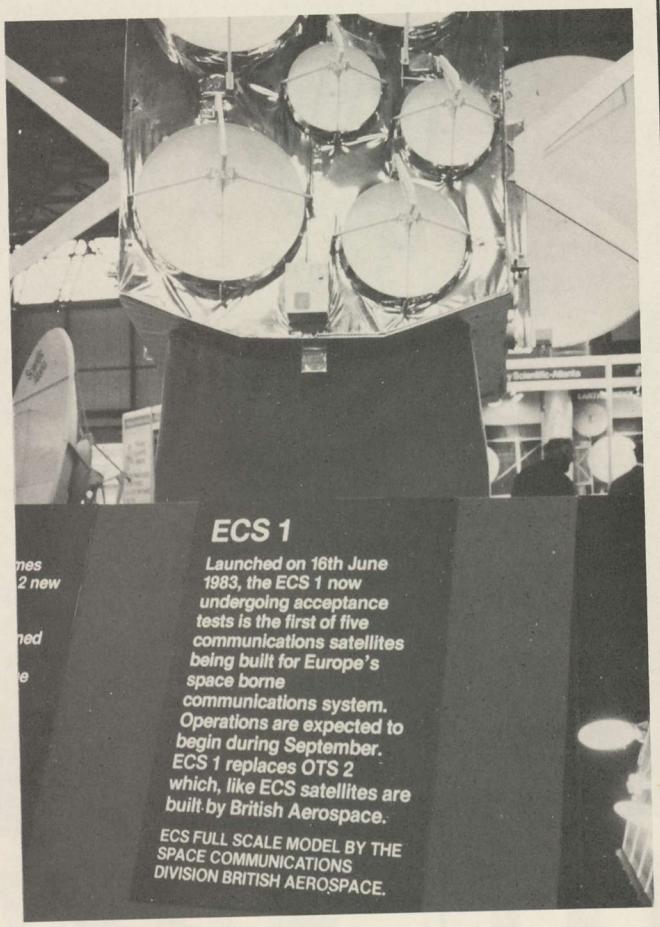
Nothing to watch? What about all of those signals we hear about? Saudi Arabia, Niger, Sudan, Spain and so on?

"I estimate there may be no more than 100 private TVROs in the UK." Speaking is **Todd Slaughter,** editor and publisher of **SATELLITE TV NEWS,** a slickly produced English publication. "There are a handful of systems at Universities and another handful of systems in use at retail stores. The rest are 4 feet to ten feet in size and they are Ham radio operators and others like that; people who are into experimentation."

American Bob Luly had it figured out less than 12 hours after arriving at Birmingham. "I feel like I am the first person in the world with a modern telephone. It does all of these wonderful things but unfortunately there are no other telephones out there so I cannot use it"!

So what about those 4 GHz feeds to Saudi and so on?

"They have absolutely no commercial value for the average person," notes **Peter Gray** of **Satellite TV Antenna Systems, Ltd.** (*). "After you sell a terminal to the Saudi Embassy and maybe a terminal or two to some wealthy Arab person who maintains a home in the south of England, who else wants to watch Saudi Arabia? Nobody, that's who"!



LIFESIZE satellite displays, some filling huge chunks of the exhibit hall, were everywhere. This is the working part of ECS-1, the new European 'cable' television bird now in operation with up to 12 video transponders.

And Spain and Sudan and Niger?

"After Saudi, it is all down hill."

Aah yes, but what about the American AFRTS service on the Intelsat bird at 1 west? That carries Johnny Carson, the TODAY Show, network news and plenty of network sporting events. In between these events they 'fill' with CNN. Is that not a desirable service?

Gray again. "We feel that the AFRTS service is the **only service** that would attract a customer base. But you can see what sort of results you have here with AFRTS." He was refering to the twin large antennas in the antenna lot; an ADM 20 footer and a Scientific-Atlanta 23 plus footer (7 meter). The pictures were, well, generously, 'not good.' This inspite of a special effort put forth by a volunteer team of American satellite people who arrived in Birmingham 20 hours before the show opened. Coop, Jamie Gowen of ADM, Art Butterfield from the Turks and Caicos Islands and Andy Hatfield of AVCOM found the ADM 20 footer partially assembled at the SATVRN antenna lot, and the S-A 7 meter functioning but perhaps not optimized. There followed around 30 man-hours of effort to complete the ADM 6 meter and optimize the S-A 7 meter. Four hours before the show officially opened Patmar's Peter Sutro arrived fresh-off an overnight flight from Newark hand carrying a pair of 70 degree range LNAs. While the 'yanks' concentrated on getting the two dish systems optimized in the rain

---

*** — SATVRN/ Satellite TV Antenna Systems Ltd., 10, Market Square, Staines, Middx, England (telephone 0784 61234).**

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The Voice of the Satellite Earth Station Industry

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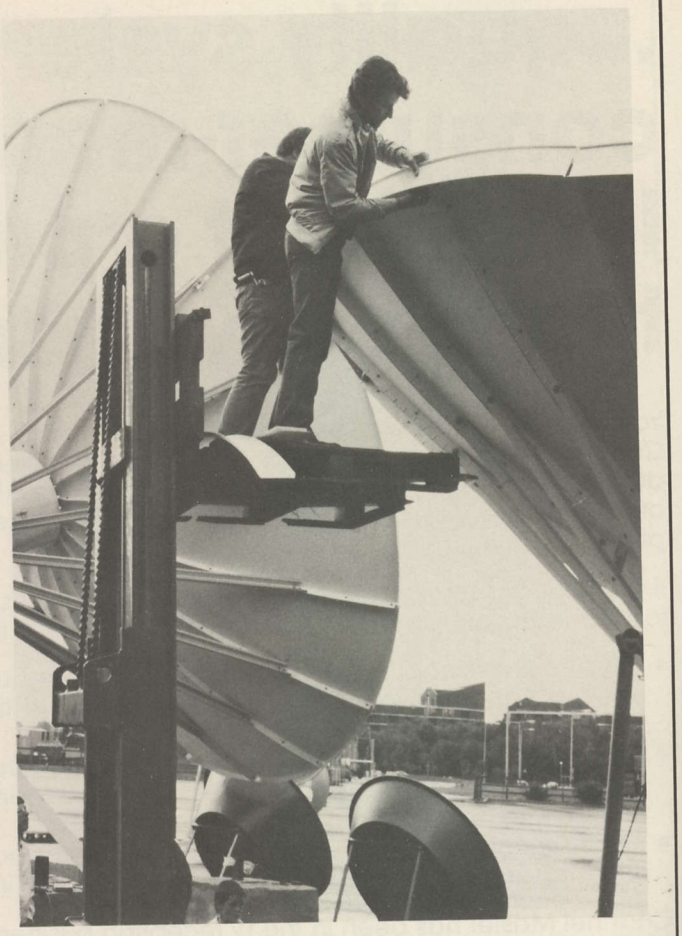
SATVRN's Mike Aarons and ADM's Jamie Gowen preparing to put the finishing touches on the 6 meter ADM antenna in Birmingham.



UP YOUR LIFT. Aarons and Gowen fit the retainer ring to the ADM six meter antenna in wet and cold Birmingham; S/A seven meter in background on left.

and cold, SATVRN's **Steve Birkill** worked on getting the last possible 1/10th of a dB of signal to noise ratio out of the receivers. When the show opened AFRTS plus a domestic Morocco signal were taken off the twin 'large dishes' and SATVRN provided feeds to approximately ten other exhibits. As you wandered around the full display area, you frequently saw CNN on display. The picture jumped every now and again, sparklies were present and the signal held up only fair in the NTSC to PAL conversion gear which SATVRN provided so the European standard-equipped booths could display the signal in the 'native' format.

"Could you sell that level of AFRTS service," we asked Peter Gray?

He didn't think so. "You can **see** the difference between the ADM six meter and the S/A (we did; it was right around the 1 dB mark in favor of the S-A) and you tell me whether people would be willing to pay money for that level of service"!

Perhaps, if we were dealing with American style 3 meter dishes. But when you have to go to at least a six meter to have service you can watch (although it was far from perfect), and you needed to be in the ten meter class to clean it up even to the point of being 'at threshold,' well, the terminals were now starting to be priced out of the average consumer's pocketbook.

Todd Slaughter again. **"The marketplace, I judge, is very limited.** Let's assume that you could buy a ten meter dish in the USA for around $40,000. Now you have to crate that system for overseas shipment, pay the crating and shipping costs, and then face uncertain import duties on the other end. Add to that the required low noise LNAs, receivers and what have you, and the supplier is already close to $50,000 before he even leaves the United States. By the time the shipping and duty assessments are paid, I think you are close to $90,000, perhaps higher, just for a terminal that brings in AFRTS. That tells me the market is very-very limited."

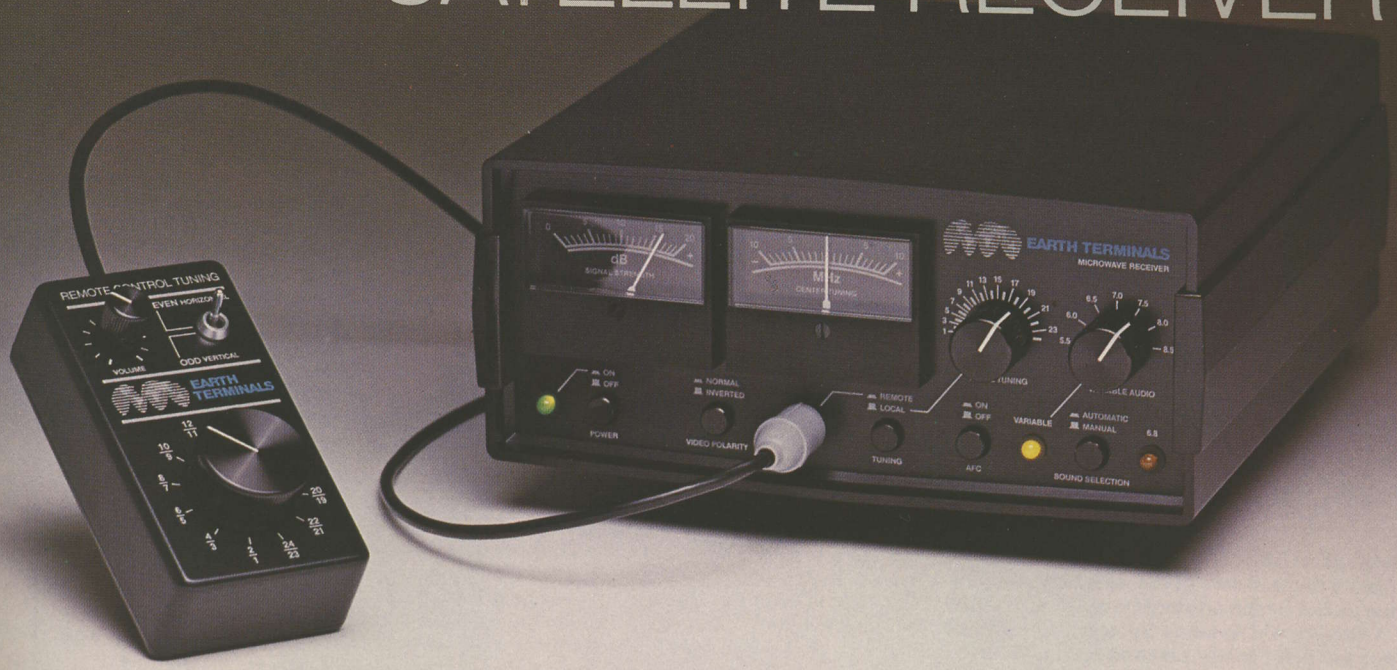
Delegates from other countries, India for example, agreed. **Rajiv Mehrota** of **Shyam Electronics,** New Delhi, India suggested, "The only marketplace I see is when there is a commercial interest involved; holiday resorts might find live American news and sports of some commercial value."

Then there was the AFRTS scrambling rumor. Several had it 'on good authority' that AFRTS would by mid-1984 be scrambled. Others suggested that even if AFRTS was not now seriously looking at scrambling the international feed, **if** it turned out that terminals started popping up all over Europe, Africa and the Middle East **using** the AFRTS signal, that alone would **probably** cause AFRTS to move to scrambling.

There was a carefully printed and carefully worded sign on display in the SATVRN booth. It said:

"This demonstration of satellite television reception makes use of signals received from a point to point telecommunications relay satellite, not a broadcast satellite. The Home Office Radio Regulatory Department has advised that demonstration of such transmissions is authorized only for testing, development and demonstration purposes. Such reception is not covered by the broadcast Receiving License, and licenses are not available **for general public reception of these transmissions. Licenses for general public reception of satellite transmissions will, when issued,** be restricted **to the reception of programmes transmitted from authorised Broadcast Satellites operating in the 11.7 to 12.5 GHz band.**

SATELLITE RECEIVER



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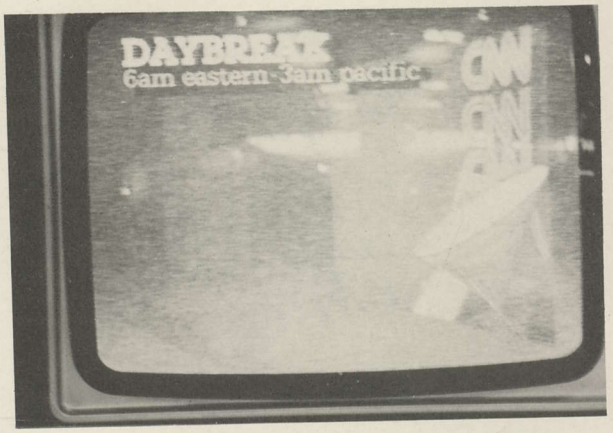

6AM IN ATLANTA/ 11 AM in Birmingham. The Intelsat 4-A feed from 1 degree west of the AFRTS service to American bases in the Indian Ocean and middle east was a target for a pair of dishes at Satellite TV Antenna Systems, Ltd. Neither the ADM 6 meter nor the S/A 7 meter cleaned up the picture totally.

Reception of satellite television transmissions without a license from the Home Office is a contravention of Wireless Telegraphy Acts."

Bottom line?

In England, at least, there is no regulatory law **permitting** anyone to have a TVRO for any purpose. There **may** even be law which says that you cannot have such a terminal. And in any event, any and all terminals must be licensed by the 'Home Office' (equivalent to the FCC/DOC) and at the present time the Home Office is not considering any applications for licenses.

That should remind North American readers of the quandry our industry faced in the fall of 1979. There **were** FCC rules requiring that **all** TVROs be FCC licensed. Interpretations of those rules suggested that if you operated a terminal without a license, you were doing something illegal. Late in 1979 the American FCC eliminated that rule and today a terminal may be owned by anyone without a license. But not in England.

If a license **is** required, but the Home Office will not consider license applications, what does that do to the English marketplace; as small as it apparently might be?

Todd Slaughter. "It makes it very difficult to attract engineers and others into the industry. **This is not a free marketplace.** It takes only a little investigation to reveal that very large terminals are required for a handful of desirable signals. When you add to this the requirement that a license be granted and then learn that such licenses will NOT be granted, well, who is going to invest large sums of money in creating products for this field"?

Might not the British simply look the other way as the American FCC did when our industry got started? Might they not leave early technology pioneers alone to 'do their thing'?

Slaughter again. "I don't think ham radio operators playing with ten foot dishes or university types trying to bring in Russia's Gorizont are in any jeopardy. But I think that the first time somebody installs a ten meter dish at a holiday resort in the South of England and pipes in AFRTS, they will close it down."

Slaughter may well be correct. The present AFRTS service is instructive here. There are approximately twenty-five American military bases on English soil; a hold over from the Second World War and the unsettled international political climate since then. Many of these bases are quite sizeable and ALL of these bases would **like to have** live American television for the service personnel. To date the Home Office has flatly denied permission **to the U.S. government** to install suitable dish antennas to bring into the bases the AFRTS service; even if it played only on cable systems within the bases.

"And, as Slaughter adds, **"WE are friendly to the US"!** He smiles and concludes with , "This has always been a quite funny country regarding broadcasting."

So England is NOT where TVRO reception is at. But what about the remainder of Europe?

The greatest freedom today exists in Belgium, Switzerland and some of the Scandinavian countries. The 'freedom' that does exist is primarily due to the extensive cable TV growth in these countries. There are cable systems in each of these nations which reach out beyond their national borders to bring in reception from other countries. A handful of 4 GHz terminals for the 41 dBw super-hot Gorizont spot beam exist and the Russian programming ends up in cable homes. But in each of these countries, the cable firms are licensed or otherwise controlled directly by the government. And if the government does not like something the cable firm is doing, or proposing to do, it steps down on the cable operator. Nobody thought the chances were good for a government to **approve** the addition of the AFRTS feed to the existing cable plants.

If the 4 GHz market is so poorly defined and unattractive, why then is there so much talk about satellite TV in Europe? The answer lies with the newly begun 11/12 GHz feeds and the plans to enlarge the number of such feeds dramatically over the next three to four years.

Each country has its own plans. Each country actually has two plans; one for cable television, and another for satellite TV. And the satellite TV plan breaks down into a pair of sub-plans; one for **DBS** (direct to the home using small dishes) and another using the **FSS** (fixed satellite service) channels down closer to 11 GHz.

There has been a cable television satellite delivered programming service in operation for approximately 18 months. It is called **Satellite Television Plc** and until the middle of October it was relayed to perhaps twenty-five cable headends (Malta, Switzerland, Finland primarily) via OTS; the experiemental 11/12 GHz satellite. Since the middle of October it has been using one of the newer transponders of ECS-1, the new 12 transponder 'cable-Europe' bird. The service is unique because it is free to the cable operators and it is advertising supported. It is also unique because it is in English. Support, what there has been of it, is in the form of sold commercial time; $2,400 for thirty seconds at the present moment. Satellite Television has lost a great deal of money in 18 months; perhaps as much as $6,000,000. It says it will lose another $10,000,000 plus before it breaks even. To make sure it has the additional $10,000,000 to lose, the majority interest in the London based firm recently was acquired by a group known as **News International.** NI is owned by Australian media heavyweight **Rupert Murdoch** and Murdoch is even closer than Ted Turner to circling the earth with a satellite network. Murdoch is one of the primary reasons why CNN and the US networks are today carried via Pacific Intelsat to Australia. Murdoch is also behind the new early-entry DBS program called **'Skyband'** here in North America. Now he also controls ST/PLC in Europe. Murdoch has been quoted as planning big things for his European service. His most oft repeated quote has him saying, **"I envision running as many as** three **separate services in Europe, via satellite, all 24 hours per day, within five years."**

ST/PLC is already up and running, now five hours per day (up from its two hours per day when Murdoch took over) and it leans heavily on sports and American series. It won't be alone long.

ST/PLC is scrambled. Just why remains something of a mystery. Most seem to agree that someplace buried deep in the various international broadcasting agreements in force in Europe, the **EBU** (European Broadcast Union) decided some years ago that all Fixed Satellite Service (11.7 GHz region) transmissions of video would be scrambled. The exact heritage, or rationale for, the decision seems to be missing. One theory is put forth by Slaughter.

"You must remember that many of the European countries, actually most of the European countries, raise revenues to operate their national television networks by placing an annual viewing tax on viewers. It amounts to as much as $50 American per year. Here in Great Britain everyone who purchases a television receiver must identify themselves. The fact that they have bought a television set ends up on a computer in the Home Office. And the computer looks for cross-matching between those who bought or own television sets and those who have paid their current annual fee. When it finds someone

CAST '83 continues/ page 50

LUXOR Quality

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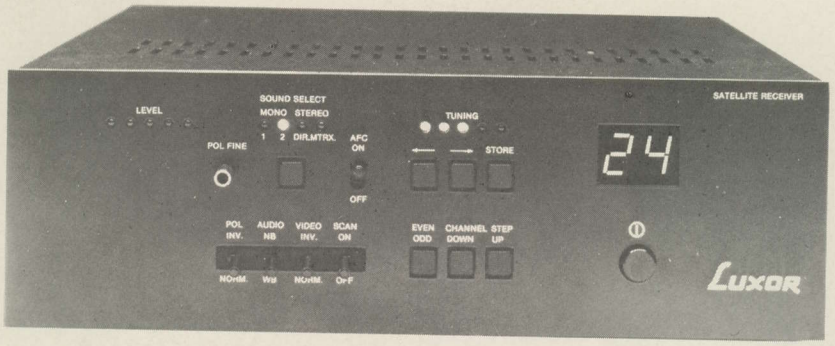
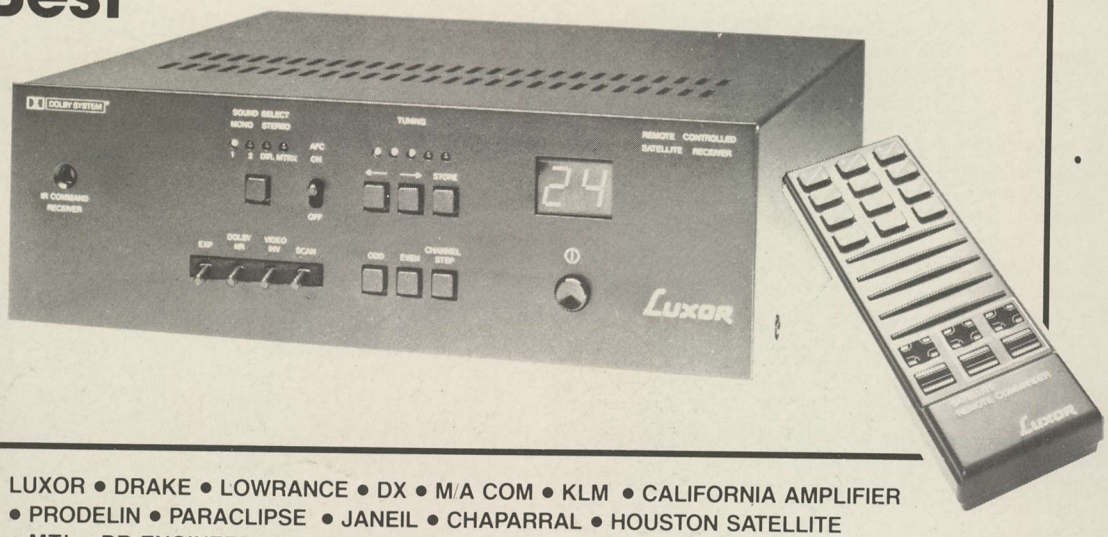


Best



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17. Vertical Polarity lamp	☑	☐
18. Horizontal Polarity lamp	☑	☐
19. Skew adjust	☑	☑
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ar Warranty

CAST '83/ continued from page 46

who owns a television set but who has not paid their fee, the scouts go into action to trace down the 'thief.' Very few people really avoid the annual fee, here or elsewhere in Europe."

And the scrambling?

"I suppose that it is envisioned that as satellite television, DBS or FSS, becomes available nationwide, **there will be a surcharge** for those who own the equipment to receive it. One way to keep track of who has the equipment is to insist that all transmissions be scrambled. The viewer will **have** to sign up for a decoder and there, as he does so, the Home Office has a computer entry of who should be paying an extra fee. All very neat"!

ST/PLC is presently scrambling with the Oak Orion system. There is no particular market for black market descramblers although we did see at least one working homebrew unit at Birmingham. It had sorted out the video alright but the audio was still missing.

"It is digital you know," explained the builder. We knew. "You really must have the 'key' to the format of the particular coding being used to sort it out; I don't know anyone who has done that."

There is confusion as to whether or not the DBS band (as opposed to the FSS band) will be scrambled. One might wonder why anyone would scramble DBS unless it was to be a subscription type of service. The BBC, for example, has announced they will be operating at least a pair of high power DBS transponders. One is envisioned as a premium service channel while the second will be a 'best of BBC' channel. Slaughter on the BBC effort.

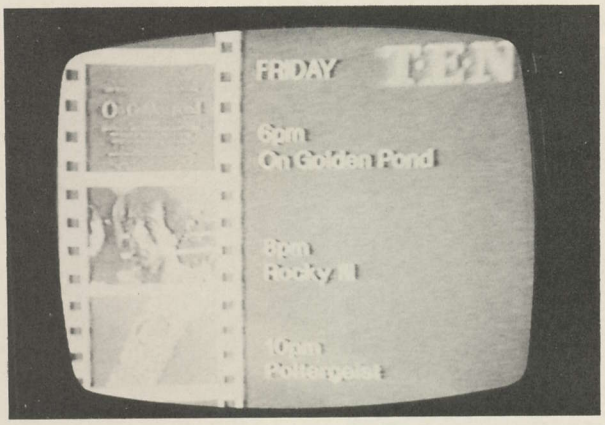
"They have a tremendous strength which nobody has focused on directly. And that is their archive of BBC programming which has been sitting on the shelf since the 1940s. Assuming it is on film and has been properly maintained, they are in a position to re-cycle years and years of BBC fare which because of its nature is no less saleable today than it was when it first came out."

The BBC has announced that at least the premium service channel will be scrambled. Other DBS efforts, aiming at all of the European market (cable plus individual home terminals) are less sure about scrambling. Luxembourg, for example, sees their role as an Europe-wide DBS programmer totally sponsored by advertising. Those planning to program **in English** would seem to have a leg-up on reaching the greatest audience, but it is far too early to tell who will do what, when, and how at this point in time. The BBC twin-channels will be directly matched by the other British broadcasting authority, the ITA, which also plans a pair of channels. And British cable systems will be required, by regulation, to carry **all** of the English satellite channels available so cable subscribers will have little incentive to install **their own** dish antennas **unless** it is for programming from other countries that is bypassed by the local cable firm.

An early effort, more or less targeted at the start-up cable services planning to be operation by mid 1984 in the UK, will use as many as five of the 12 GHz transponders on an Intelsat V bird. Who will jump onto these channels, early, is not known yet but the planning is going ahead nonetheless.

The programming race is on all over Europe but no place as intensely as in the British Isles. Most of the new British cable systems will have 30 channel capacity. After backing out the channels required for local terrestrial and British satellite services, that still leaves more than half of the capacity available for optional system by system offerings. At CAST '83 the first of those in the marketplace were pumping up their image.

There are at least two serious contenders for the movie service package and **TEN** (Television Entertainment Network) is representative. Because the movie industry is really worldwide, there is ownership presence in virtually all of the planned efforts by American and other non-British movie firms. TEN promoted their initial service (not yet available but promised by early 1984, probably via Intelsat V at 12 GHz) at CAST '83 with considerable fanfare. The service would sign-on around 12 noon and end transmissions after midnight London time. Daytime movies would be family targeted while evening movies would be more adult oriented. **Pricing is a current concern.** Money does not flow as freely in the UK as it does in North America and because nobody has really **tested** the public's willingness to shell out the equivalent of $9/12 per month American for a single movie channel, there is considerable skepticism about whether it will work and penetrate sufficient homes to be profitable. There is one **major difference** between the TEN-type services planned and those now operating in North America; the majority of the ownership in all of the front runner systems is held by the movie firms **directly.** Having been denied access to the American homes by middleman firms such as HBO here, the movie firms are not about to repeat the same 'mistakes' in Europe.



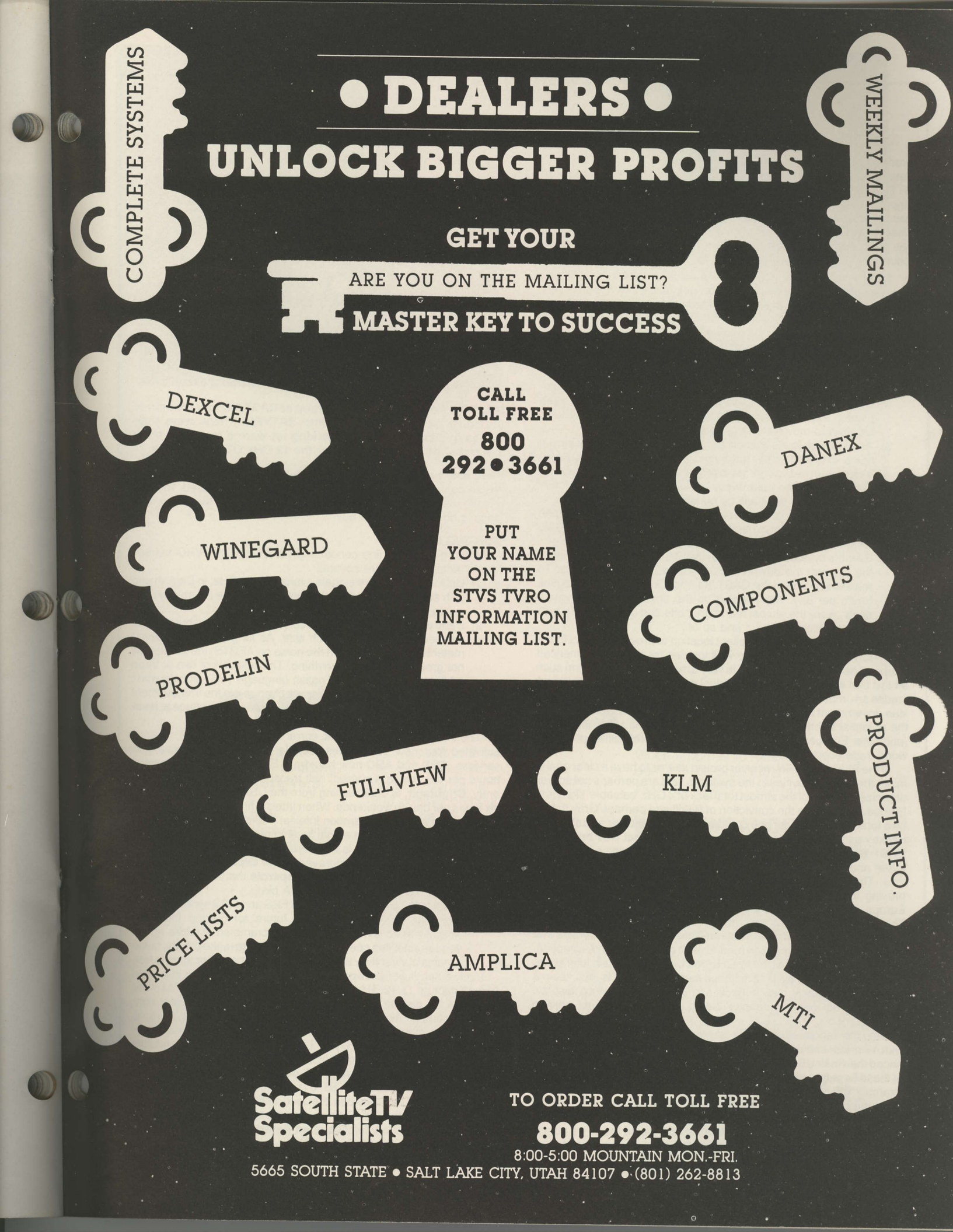
TEN/ Television Entertainment Network looks like a cross between HBO/Showtime and Cinemax. Typical day's schedule being promoted started at around 12 noon GMT and quit shortly after midnight.

There is another of-concern difference; the price being charged by the film owners for their product. Whereas movies such as 'On Golden Pond' make it into American homes via HBO for around $.20 per movie, in Europe the figures will double and treble. And, since the monthly rate has a top-end which the public will accept, this means that services such as TEN will have fewer dollars to work with per movie in Europe. And for the consumer, this means **fewer** new **movies each month.** One of the front runner services currently plans to offer only ten new movies per month, filling around those with older movies which cost very little to show and re-show. This also suggests that European movie service channels will have far more 'repeats' than their American counterparts and that also concerns some of the marketing people who worry about the price per home being too high. There remains a great deal of 'sorting out' to do.

If the programming to be available, and the satellites to be used, is still unsettled, the equipment to be bought and employed is no more certain. The only major equipment announcement at CAST '83 was the **Steve Birkill/Peter Gray** effort under the **SATVRN** banner. Birkill has created a block down conversion package with models for virtually anyplace in the world. SATVRN offers receivers that cover 2.6 GHz (India and Arabsat), 3.65-4.2 GHz (the extra low-end bandwidth is for the Russian birds), 3.7-4.2 GHz (North America, Intelsat), 11.7-12.2 GHz (US and Canada), 11.7 to 12.5 GHz (Europe) and 12.5-12.75 GHz (Europe and Australia).

Employing a low noise block down converter (above selected input frequency range 'in'; 0.95 to 1.70 GHz output, nominal) approach, the demodulator/receiver typically has a dozen push button selected individual transponders. Birkill has opted to use a linear PLL for his demodulator and publishes a static threshold C/N of 7.5 dB. The gated clamp circuit can be by-passed for descrambling units that mount outboard. With a 14 dB C/N the package claims a 50 dB video SNR.

In addition to the commercial BDC approach, Birkill has also created a **consumer grade receiver** which he hopes will penetrate the twin markets of the USA and Indonesia; the only two apparently viable 4 GHz markets for home TVROs in the world today. This package has a BDC with a 15 dB noise figure, an output IF range of .95 to 1.45 GHz (the same as the **DX** units), 24 channels selected by a step-step-step knob, an audio demodulator that tunes the 5.5 to 8.5 MHz region. A video SNR of 52 dB is claimed with an input C/N of 14 dB.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The SATVRN effort is today someplace between start-up and first production. Peter Gray heads up the firm and much of the backing to date has been out of his pocket. Gray first attended the Fort Worth STTI gathering some 18 months ago and impressed by the American vigor in this field went home and located Birkill. Since that time the firm has been established, Birkill has moved from Sheffield to a location close to the Wales factory recently completed for SATVRN, and Gray has attempted to focus on the quick-silver nature of the European industry.

Serious talks with a number of American distributors, including Patmar's **Peter Sutro,** have been on-going. SATVRN would very much like to export the Birkill designed receivers to North America and there is considerable optimism that the 'Birkill name' on a receiver will earn it early acceptance in the marketplace. Between that 'wish' and reality are a number of problems.

1) **Moving from models** to production line manufacturing is no small step. Gray had a pair of representatives from the Welch Development Board at Birmingham to help them become better educated about the worldwide nature of the TVRO marketplace. Gray looks to a group such as this for the financing required to move into large scale production.
2) **Any US distributor** handling a Birkill receiver will be facing the same long-supply-line problems faced by STS's **Jim Rothbarth** when he brought in the fabled Luxor product(s). Because of the transit time from Wales to North America, the inventory on one or both ends will be considerable.
3) **A repair depot,** on North American soil, is almost mandatory. Dealers are not apt to handle a receiver that has to travel 6,000 miles or more, round-trip, for a tune-up.
4) **Birkill's concentration** to date has been on the RF portions of the system; the down converters and the demodulators. To make the timing of the CAST '83 Show, he was flat-out 18 plus hours per day. Still missing, at the time of the Birmingham show, were the almost mandatory bits and pieces; .95 to 1.45 line amplifiers, splitters and so on.

SATVRN may be in an excellent location to provide product to the European market, if it is not so well located for the North American market. The Welch government is very anxious to support a firm such as this that will sell most of its product outside of the country; import credits are important to their future economy. And whereas the American government supplies very little real assistance to firms that have the potential to bring other world currencies to the USA, the Welch (and other European) government(s) has an entirely different view of world trade economics.

If the Birkill/SATVRN receiver project seems to have a clear goal in mind, their other activities in the system's field are perhaps not so well organized. Inspite of the almost total lack of 4 GHz 'saleable' signals in Europe, it **had been** the conviction of Birkill and perhaps Gray that to be a total 'satellite TV service company' they **must offer** a quality total turnkey package of at least seven meter size. That was **before** the CAST '83 show, and the less than satisfactory showing on the S/A 7 meter and ADM 6 meter dishes from the much desired AFRTS service. The antenna portion of any such 'monster-4GHz-system' is proving to be a formidable hurdle. There are no antenna firms in Europe dealing with mid-range antennas (6 to 10 meters in size). There are many-many firms creating 1 to 4 meter dish surfaces and most of these seem to have the same basic approach to antennas that we find in the North American market; with one noteworthy exception. All of their efforts point at 11/12 GHz and because the dish tolerances must be three times as 'tight' in these bands as at 4 GHz, you seem a much higher quality dish surface and support system on display. There are no 'mesh antennas' being manufactured and sold in Europe.

And the handful of high buck, extremely professional firms dealing with 11 meter and up size antennas for Intelsat work are even higher priced than their US equivalents (i.e. Andrew, S/A, etc.). To date, none of these firms has taken the middle road characterized by Prodelin, for example, offering mid-size antennas using production techniques that bring the price down dramatically while still retaining a professional quality.

All of this hurts people like SATVRN who would like to be able to offer total-turnkey private (4 GHz) systems for whatever market **as**

MAJORITY of the antenna dish farm at CAST '83 was brought to the show by the Birkill/Gray firm SATVRN. These were their dishes and scattered in the parking lot were a few more three meter and down size dishes for the 12 GHz OTS/ECS feeds.

there may be for the big buck AFRTS-type systems. **If** the antenna has to come across the Atlantic, as previously discussed, the end price to the user is jacked up to the point where only those to whom 'price is no object' will still buy.

SORTING It All Out

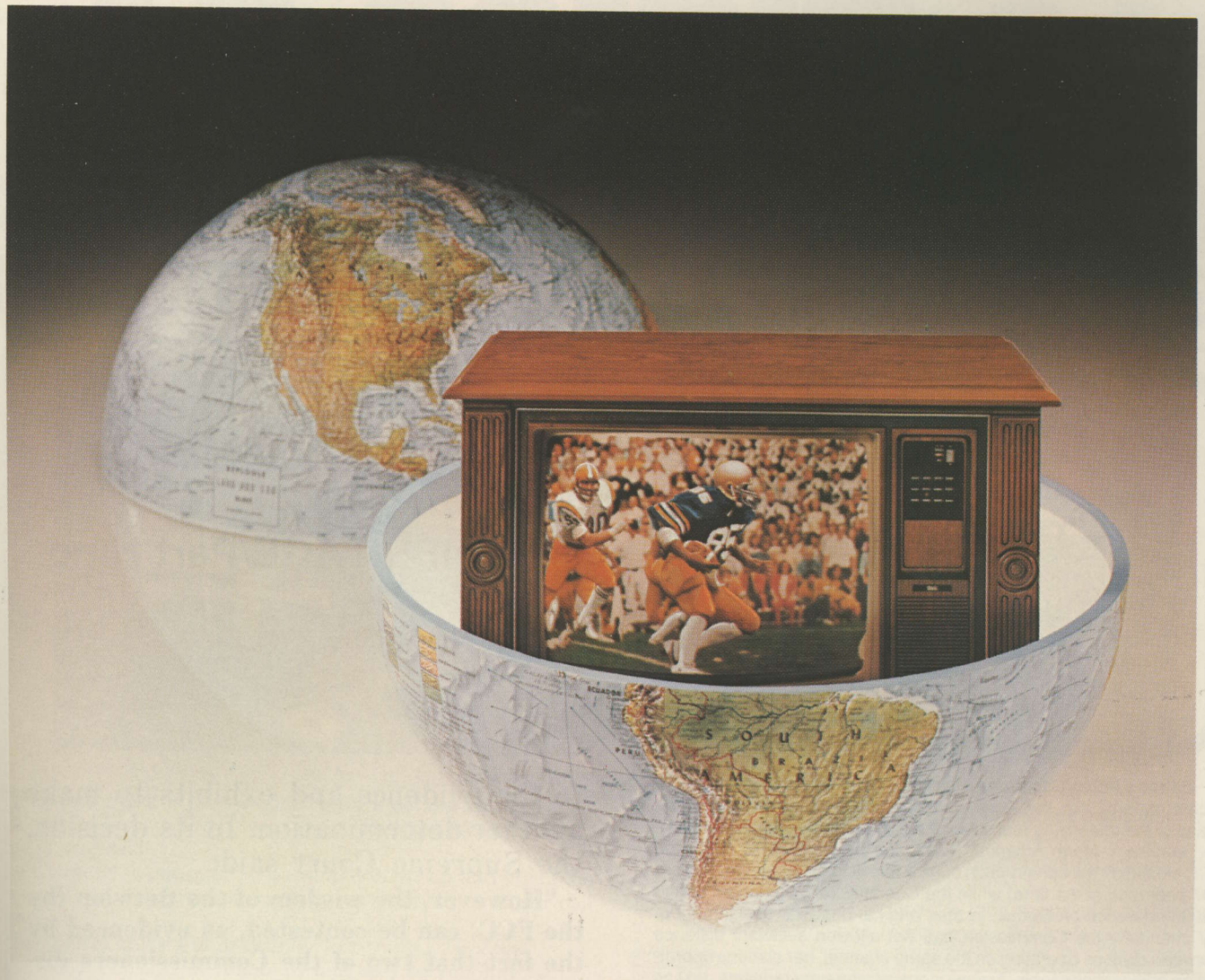
Is there a bottom line concerning the European TVRO market, today? Actually there are several.

1) Until there are more signals available at **4 GHz,** in English and with some regular schedule, that marketplace is virtually non-existent.
2) If and when additional signals come along, the next hurdle to be crossed is the terminal dish size. As long as six and seven meter terminals are still in the noise on AFRTS, the market will not grow or amount to anything. The addition of two or three additional AFRTS type English language (US) signals won't change that very much. What will change it is the improvement in power levels so that 5 and 6 meter antennas produce **at least threshold** level signals.

The Intelsat at 1 degree west, currently carrying AFRTS, recently activated four new more-or-less regular additional American-type services. **CBS** and **ABC** now haul from Europe to the USA several hours per day (using a shared, half transponder format) and a new entry, **Brightstar,** is back hauling from the USA to Europe with up to six hours per day on weekends. When Intelsat finally does replace this 4-A bird with a newer generation Intelsat V bird (as early as mid-84), there **should be** a 3 dB in signal level improvement for all of these services. The **'should be'** is key here however since while the bird (Intelsat V) will have a 3 dB improved power **capability,** there are no guarantees that Intelsat will **actually operate** the bird at any higher levels than it does with the present 4-A bird.

3) The 11/12 GHz market, for both FSS and DBS service, seems the clear 'TVRO market of the future' for Europe. However, whether there will be sufficient **un**scrambled services on the various satellites operating in this region to make private, home terminals attractive, will not be known for another year or two.

Only a handful of **European** firms has announced their intentions to manufacture 11/12 GHz receivers and terminals. Virtually all of the hardware on display in Birmingham was from **DX** and other non-European firms. Few doubt that **when** there is a real market, there will be European manufactured product on the market. The present generation 3.5 to 4 dB noise figure LNC units available are probably 'sitting ducks' for improved front end, low noise figure technology. There was one very interesting **2.2 dB noise figure LNA** package quietly being tested at CAST '83. It is a retro-fit package that you can slap on the DX LNC between the feed and the LNC. The price we heard was very attractive and here was the real surprise. It had come to Birmingham in the briefcase of an **American** supplier and it was totally an American product.



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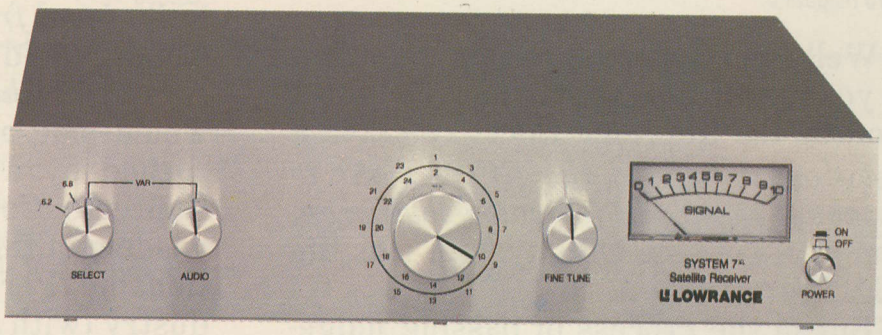

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In summary, it would appear that at the present time the best involvement for the American TVRO marketplace, in Europe, is as either a customer for European produced hardware (i.e. the Birkill SATVRN receiver package), or as an 'exporter of technology,' under license, to European firms who are better equipped to struggle along in Europe until the market is better defined. The number of American suppliers we saw in Birmingham was impressive. People such as **Peter Drake** (R.L. Drake Company), **Bob Taggart** (Chaparral Communications), **Gene Augustin** (Simulsat) all freely admitted they were at Birmingham to form their own opinions of just how viable the European marketplace might be. Bob Luly, who always seems to have that one liner on the tip of his tongue that sums it all up, said what many were thinking.

"There is no market here yet, and there may not be for quite some time."

THE ROOTS OF TVRO

OUR HERITAGE/Part Nine

Editor's note: This series runs in **CSD** because it gives the more recent entrants into the world of 'fringe television systems' a better grasp of the underlying faults which run through the television reception service in North America. During the period 1948 to 1953, the FCC closed off the construction of **new** television stations (there were 107 operating at the time) while the Commission's engineers sorted out 'interference problems.' In their original post-war assignment of TV channels, the Commission had not allowed sufficient distance between stations operating on the same channel, nor stations operating on adjacent channels. Tremendous interference resulted. Just as the Commission was sorting out that problem (1951; after three years of study), along came color TV. The present NTSC color standard was **not** originally **adopted by the FCC;** rather a CBS 'field sequential system' was approved by the Commission. The CBS system had several problems, not the least of which was that to create the colors a huge spinning disc with colored cellophane panels had to be 'rotated' in front of the CRT; in synchronization with similar rotating plastic coated discs at the originating station. When we last left this series, CBS had gained approval for **their** color system and it looked like everyone was forever married to hugh spinning discs built into their television sets, if they wanted color. How we got out of that dilemma follows. This series was originally written by Coop in the mid 70's for **CATJ** magazine.

Well if the suspense of this is getting to you, be advised that after a couple of months the Supreme Court released a decision: *it backed the FCC's right to establish standard for color television,* and in effect, the CBS system *was* finally approved.

But in the process of passing judgement on the FCC's legal right to set and adopt standards for color television, it was evident that the Supreme Court had dug down deeply enough into the evidence and exhibits to make another determination. In its decision, the Supreme Court said:

"However, the wisdom of the decision (by the FCC) can be contested, as evidenced by the fact that two of the Commissioners dissented in the decision. It is not the job or function of the courts, however, to overrule an administrative decision, merely because the courts may disagree with its wisdom."

It appeared that the Supreme Court was establishing a dangerous precedent for future contestants of the FCC. In effect, as long as the FCC was within its *legal framework* to make a decision, it could make *virtually any decision it wished.* And these decisions would not and should not be overturned by a federal court, even the Supreme Court, *merely because* the wisdom of the FCC decision was questionable. Perhaps the broadcasting industry (with all of its ramifications) did not realize it at the time, but this was to become a very significant milestone for future television hassles. The *doctrine of administrative agency exper-*

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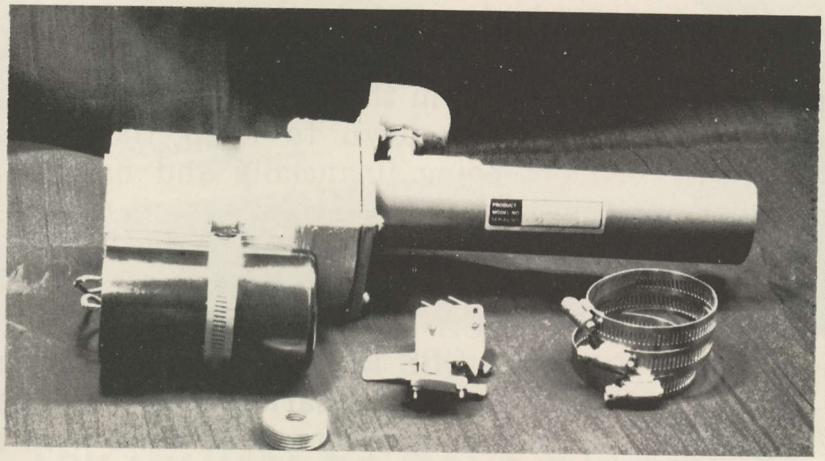

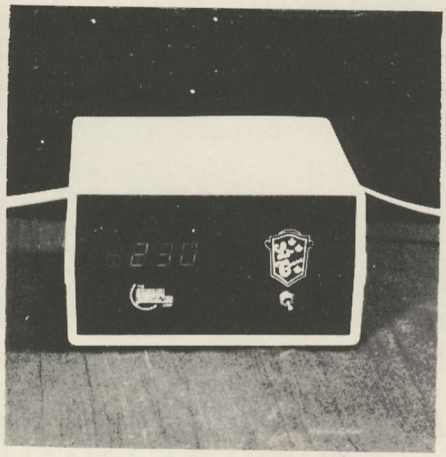

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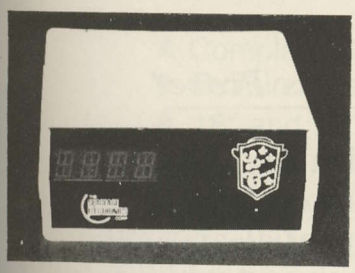

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tise was to become supreme, *larger even than the Supreme Court* of the land. All the FCC had to do to stay out of trouble was to base decisions on whatever criteria it wished, *as long as it stayed within the broad regulatory areas* which the Communications Act of 1934 established.

Well now, we obviously do not have CBS field sequential color spinning discs in our receivers today. Even a small child knows that we have all electronic colorcasting. If the Supreme Court backed the FCC, what prevented CBS from running with the ball?

Believe it or not, it was the Korean War!

During the late summer and fall of 1951, CBS felt pretty comfortable, even though RCA and others were steadily making large scale improvements in color of their own making. CBS made a big noise about ordering 250,000 small electric motors to build color receivers with, and there was a small (very small) increase in color broadcasting activity.

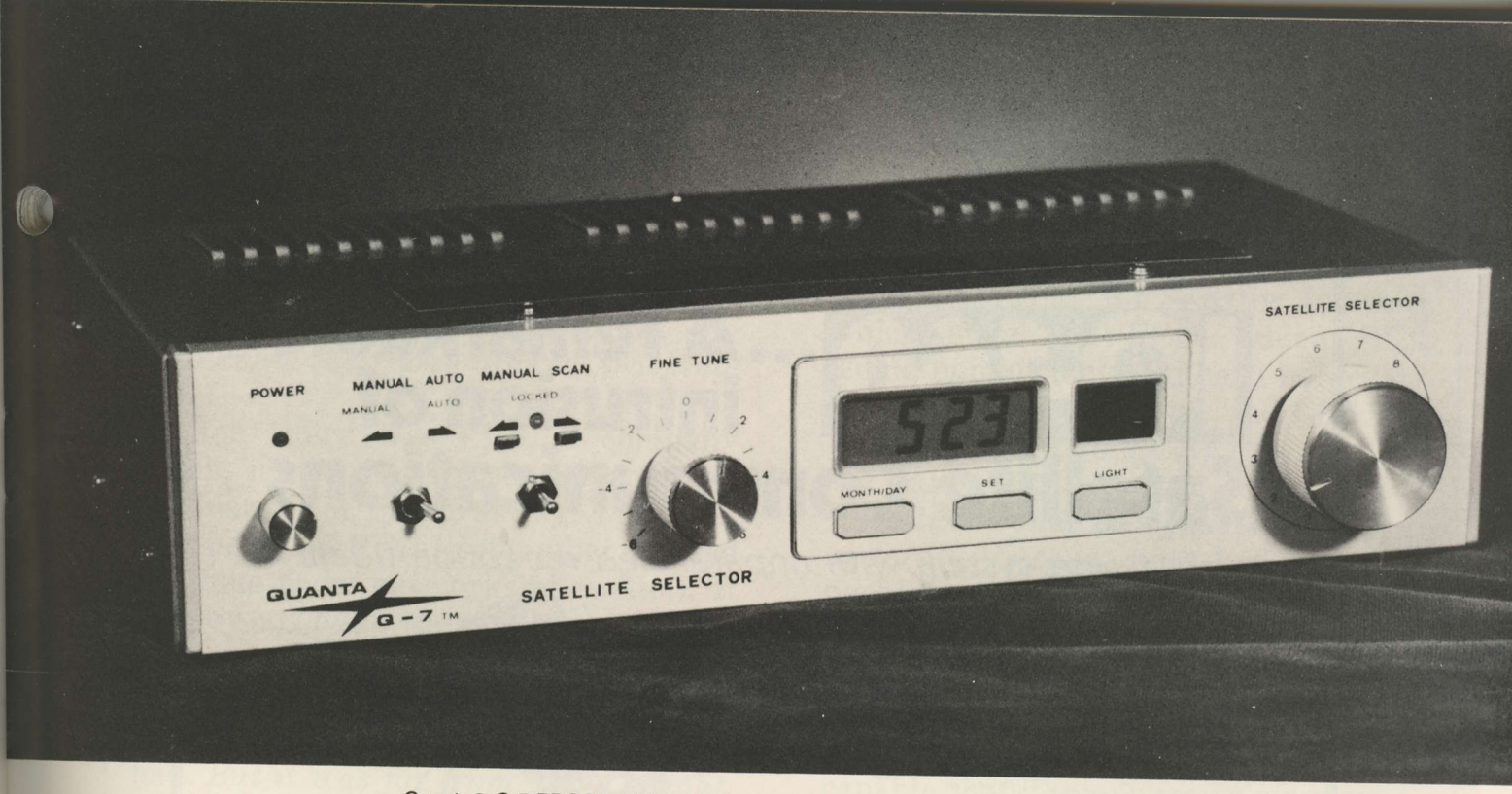
Then in mid-fall of 1951 the Washington Chief of Defense Operations, Charles E. Wilson, did what the federal courts could not do for RCA and the all electronic color group. *It shut down CBS production of color sets.* The defense requirements for the Korean War had built steadily, and the use of certain materials which were going into CBS color receivers was required for the war effort. Because CBS was the only manufacturer of CBS color receivers at that point, CBS also announced that it would shut down (for the duration of the war) CBS colorcasting (i.e. no receivers, why have programs?).

At the point of shut down, CBS color receivers were just beginning to come off the production line. At the same time, the compatible color group had made dramatic improvements in their system. The *smart money* of that era was certain that CBS had engineered the shut down to keep themselves from being financially and nationally embarassed by a color system that was doomed before it ever began. The *not-so-smart money* of that era was betting that RCA and others prompted the visit to CBS Prexy Frank Stanton by Defense Head Charles Wilson to keep CBS from getting a head start with 12 inch whirling disc color receivers. Those who didn't bet money on anything merely accepted the fact that the CBS production really did need to be shut down for the war effort.

And when the Korean War was over, and the manufacturing embargoes were lifted, the interim development of compatible color had run full circle. In a not very controversial and not very lengthy debate, the all industry supported compatible color program initiated by RCA *became the standard*, and in 1954 the nation would purchase 5,000 compatible color television receivers, followed by 25,000 the following year.

What Does All Of This Prove?

Consider the litigants before the FCC: RCA, the owner of the NBC network, the most influential and extensive developer of black and white television standards, and a company that poured millions upon millions into the development of the television art in the 30's and 40's. No one could or



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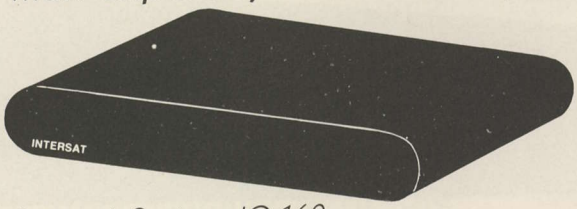
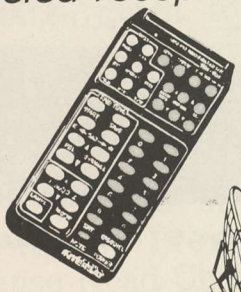
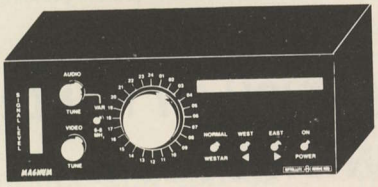
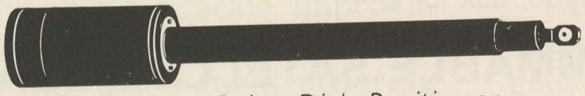


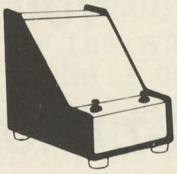
Intersat System IQ-160





Satellite Marketing Magnum Series System





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would ever question the heavyweight status of this giant. They had nothing but the best people, at all levels, *and they knew their way around Washington.*

Then there was CBS, a company which, if you go back far enough into the history of broadcasting, began as an offshoot of RCA (Remember the red and blue radio networks? Few do!). It was by all *odds* the underdog in this contest, simply because it was not heavily into manufacturing and hardly had the financial resources that RCA had. *But it was far from being a lightweight,* and it had top people also. On a one to one basis, CBS people were every bit the match of NBC people. *And they knew their way around Washington.*

CBS was also pretty swift on its feet. It did things (like the Armory demonstrations of color for Senator Johnson, which riled the FCC) which RCA would ponder long and hard before doing. *Youth is impetuous,* and CBS was (in comparison to RCA) the youth of the pair.

Neither could be considered a true underdog, because both had top notch people and top notch credentials.

Both were much more capable than the Commission. The 7 Commissioners of that era were no more nor no less capable than the average Commissioner. Chairman Wayne Coy was an extremely sharp fellow and a good leader. Still, the Commission seemed determined to make a dumb decision, and to make it too fast, without a satisfactory understanding for what it was they were doing. No facts, no evidence,

could apparently deter the Commission from making their dumb decision. The Korean War, for all of its terrible side effects on our nation, at least saved us from non-compatible color television, even if it did not save all of Korea from Communist domination.

OUR look at the early television history in the United States has now taken us through the 'freeze' era where no new stations were allowed, and through the companion color TV standards squabble. This series will continue with a look at the first UHF television in the world and the billions of dollars lost in the first decade of UHF TV.

MOLNIYA PROGRAM/ continued from page 18

```
1010  POKE AQ + 1,0:AZ =  PEEK (A
     Q): REM  AZ=AZIMUTH AT SENSO
     R POSITION 0
1020  POKE AQ + 1,1:EL =  PEEK (A
     Q): REM  EL=ELEVATION AT SEN
     SOR POSITION 1
1030  POKE AQ + 1,4:TP =  PEEK (A
     Q): REM  TP=TEMPERATURE AT S
     ENSOR POSITION 4
1040  VTAB 1: HTAB 1: PRINT "* *
     * RUSSIAN (MOLNIYA) TRACKING
      * * *"
1050  VTAB 4: PRINT "AZIMUTH    E
     LEVATION    SIGNAL STRENGTH"

1060  VTAB 6: HTAB 3: PRINT AZ;
      TAB(15);EL; TAB( 29);SS;"  "
1070  VTAB 9: PRINT "STATUS:"
1072  VTAB 11: PRINT "NEXT DATA:
      ";HR;" ";MN;"  ";A;"  ";E;"
       "
1080  VTAB 13: PRINT "CURRENT TIM
     E  ";T$
1090  VTAB 15: PRINT "CURRENT TEM
     PERATURE:  "; INT ((TP - 78)
      / 1.61);"  "
1094  VTAB 15: HTAB 28: PRINT "CE
     LSIUS"
1100  VTAB 17: PRINT "WIND SPEED:
     "
1102  VTAB 17: HTAB 19: PRINT "KP
     H"
1105  VTAB 17: HTAB 14: PRINT  INT
     (WS / 2);"  "
1110  VTAB 20: PRINT "ADJUSTMENT
     INDICATOR:  "; INT (AI - RA)
     ;"  "
1120  IF H = 14 AND M = 25 THEN
      PRINT G$
1200  RETURN
1500  REM  SIGNAL STRENGTH STARTE
     R
1520 II = II + 1
1530 N(II) = SS / LL: REM  N(II)=
     AVERAGE VECTOR, SS=SIGNAL STR
     ENGTH, LL=NUMBER OF CYCLES T
     O BE AVERAGED
1540 SUM = SUM + N(II): REM  SUM
     = PARTIAL SUM OF AVERAGES
1550  IF II < LL GOTO 1700
1560  IF CC = 0 THEN AI = SUM: REM
      CC=RUNNING SUM FLAG-SET TO
     1 AFTER INITIAL AVERAGE AI H
     AS BEEN TAKEN
1570 CC = 1:RA = SUM: REM  RA=RUN
     NING AVERAGE
1580  IF RA > AI THEN AI = RA: REM
      SIGNAL IS IMPROVING
1590  IF AI - RA > PP THEN AC = 1
     : REM  PP = MAX ALLOWABLE AV
     ERGE DEVIATION, AC=ADJUST FLA
     G-WHEN 1 ADJUST
1600 II = 0
1610 SUM = 0
1620 II = II + 1
1630 JJ = II + 1
1640 N(II) = N(JJ)
1650 SUM = SUM + N(II)
1660  IF II = LL - 1 GOTO 1700
1670  GOTO 1620
1700  RETURN
2000  REM  PREDICTION OF DATA MOV
     EMENT
2003  IF PF = 1 GOTO 2010
2005  IF  ABS (EL - ED) > 15 OR  ABS
     (AZ - AD) > 15 THEN PF = 1: REM
      PF=CHANGE-OVER PRINT FLAG
2010  IF EF = 1 GOTO 2060
2020  IF (EL - ED) = 0 GOTO 2050
2030  IF (EL - ED) > 0 THEN E$ =
     "DOWN "
2040  IF (EL - ED) < 0 THEN E$ =
     "UP   "
2045  GOTO 2060
2050 E$ = "":EF = 1
2060  IF AF = 1 GOTO 2110
2070  IF (AZ - AD) = 0 GOTO 2100
2080  IF (AZ - AD) > 0 THEN A$ =
     "  WEST"
2090  IF (AZ - AD) < 0 THEN A$ =
     "  EAST"
2095  GOTO 2110
2100 A$ = "":AF = 1
```

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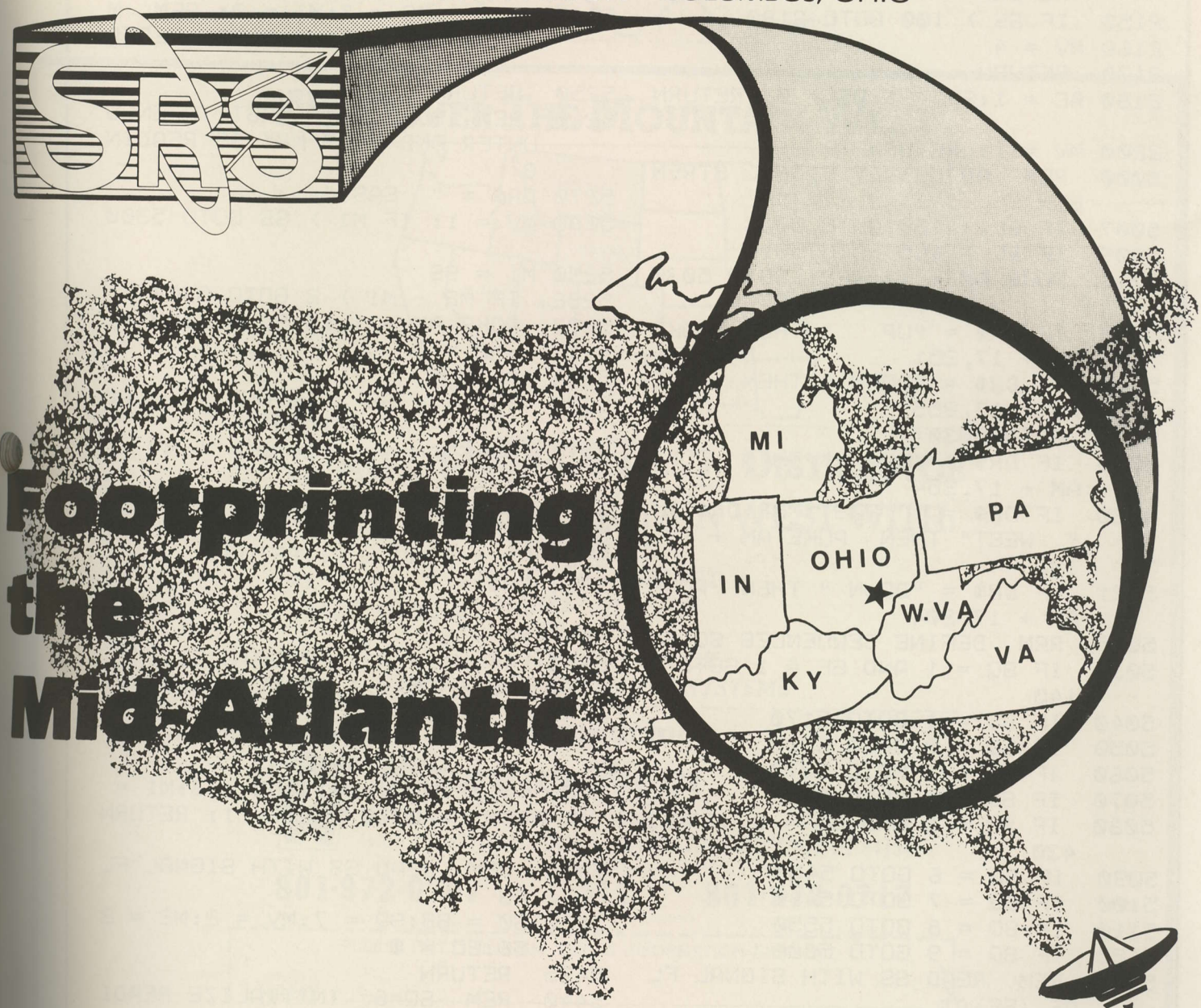

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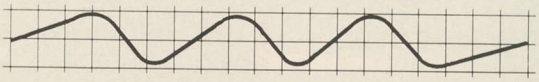
```
2110 DR$ = E$ + A$
2120  IF EF = 0 OR AF = 0 GOTO 22
     00
2130  POKE AM + 1,15
2140 DE = ED:DZ = AD
2145  IF MV = 1 THEN MV = 2:
      RETURN
2150  IF SS > 100 GOTO 2180
2160 MV = 4
2170  RETURN
2180 AC = 1:SF = 1:DF = 0: RETURN

2200 MV = 1: RETURN
5000  REM  ADJUST BY SIGNAL STREN
     GTH
5007  IF EL < 160 GOTO 5013
5009  IF EL > 165 GOTO 5019
5011  POKE AM + 17,222: GOTO 5030

5013  IF DR$ = "UP    " THEN  POKE
     AM + 17,251
5015  IF DR$ = "DOWN " THEN  POKE
     AM + 17,255
5017  GOTO 5030
5019  IF DR$ = "UP    " THEN  POKE
     AM + 17,254
5020  IF DR$ = "  EAST" OR DR$ =
     "  WEST" THEN  POKE AM + 17,
     191
5021  IF DR$ = "DOWN " THEN  POKE
     AM + 17,204
5025  REM  DEFINE SEQUENCES SQ'S
5030  IF SQ = 1 AND SF = 1 GOTO 5
     140
5040  IF SQ = 1 GOTO 5170
5050  IF SQ = 2 GOTO 5200
5060  IF SQ = 3 GOTO 5270
5070  IF SQ = 4 GOTO 5326
5080  IF SQ = 6 AND SF = 1 GOTO 5
     430
5090  IF SQ = 6 GOTO 5450
5100  IF SQ = 7 GOTO 5480
5110  IF SQ = 8 GOTO 5550
5120  IF SQ = 9 GOTO 5606
5130  REM  READ SS WITH SIGNAL FL
     AF (SF)
5140 S0 = SS:SQ = 2:MV = 2:M2 = 2
     56:ZC = 0
5150  RETURN
5160  REM  SQ=1,INITIALIZE READIN
     G
5170 S0 = RA:SQ = 2:MV = 2:M2 = 2
     56:ZC = 0
5180  RETURN
5190  REM  SQ=2 MOVE WEST UNTIL B
     OUND REACHED
5200 DR$ = "  WEST":S = S0
5210 MV = 1
5220  IF S0 - SS < 10 AND A0 - AZ
      < 5 THEN  RETURN
5230  POKE AM + 1,15
5240 MV = 2:SQ = 3:M1 = 0: REM  M
     1=MAX SS READING ENCOUNTERED

5250  RETURN
5260  REM  SQ=3 MOVE EAST TO ENCO
     UNTER AND PASS MAX SS READIN
     G
5270 DR$ = "  EAST"
5280 MV = 1: IF M1 > SS GOTO 5300

5290 M1 = SS
5292  IF M2 - M1 > 2 GOTO 5300
5293  POKE AM + 1,15:SQ = 6:MV =
     2:M2 = 0
5294  RETURN
5300  IF M1 - SS < 10 AND AZ - A0
      < 5 THEN  RETURN
5310  POKE AM + 1,15:SQ = 4:MV =
     2:M2 = 0: RETURN
5320  REM  WEST TO MAX
5326  IF ZC < 4 GOTO 5330
5327 SQ = 6:MV = 2: RETURN
5330 DR$ = "  WEST":MV = 1: IF M2
      > SS GOTO 5350
5340 M2 = SS
5350  IF M1 - M2 > 2 GOTO 5370
5360  POKE AM + 1,15:MV = 2:SQ =
     6: RETURN
5370  IF M2 - SS < 10 AND A0 - AZ
      < 5 THEN  RETURN
5380  POKE AM + 1,15:SQ = 3:M1 =
     0:MV = 2:ZC = ZC + 1: RETURN

5420  REM  READ SS WITH SIGNAL FL
     AG
5430 S0 = SS:SQ = 7:MV = 2:M2 = 2
     56:EC = 0
5435  RETURN
5440  REM  SQ=6, INITIALIZE READI
     NG
5450 S0 = RA: IF S0 < SS THEN S0 =
     SS
5455 SQ = 7:MV = 2:M2 = 256:EC =
     0
5460  RETURN
5470  REM  SQ=7 MOVE DOWN TO ESTA
     BLISH LOWER BOUND
```

PEAK TO PEAK

AND PEAK TO PEAK



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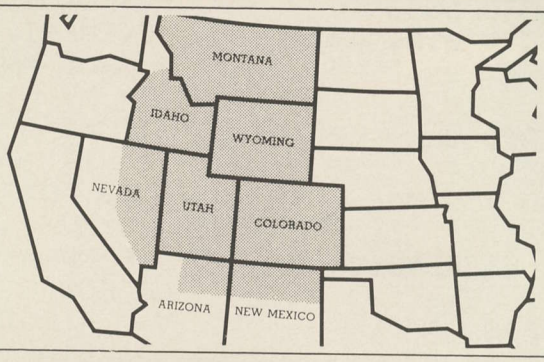

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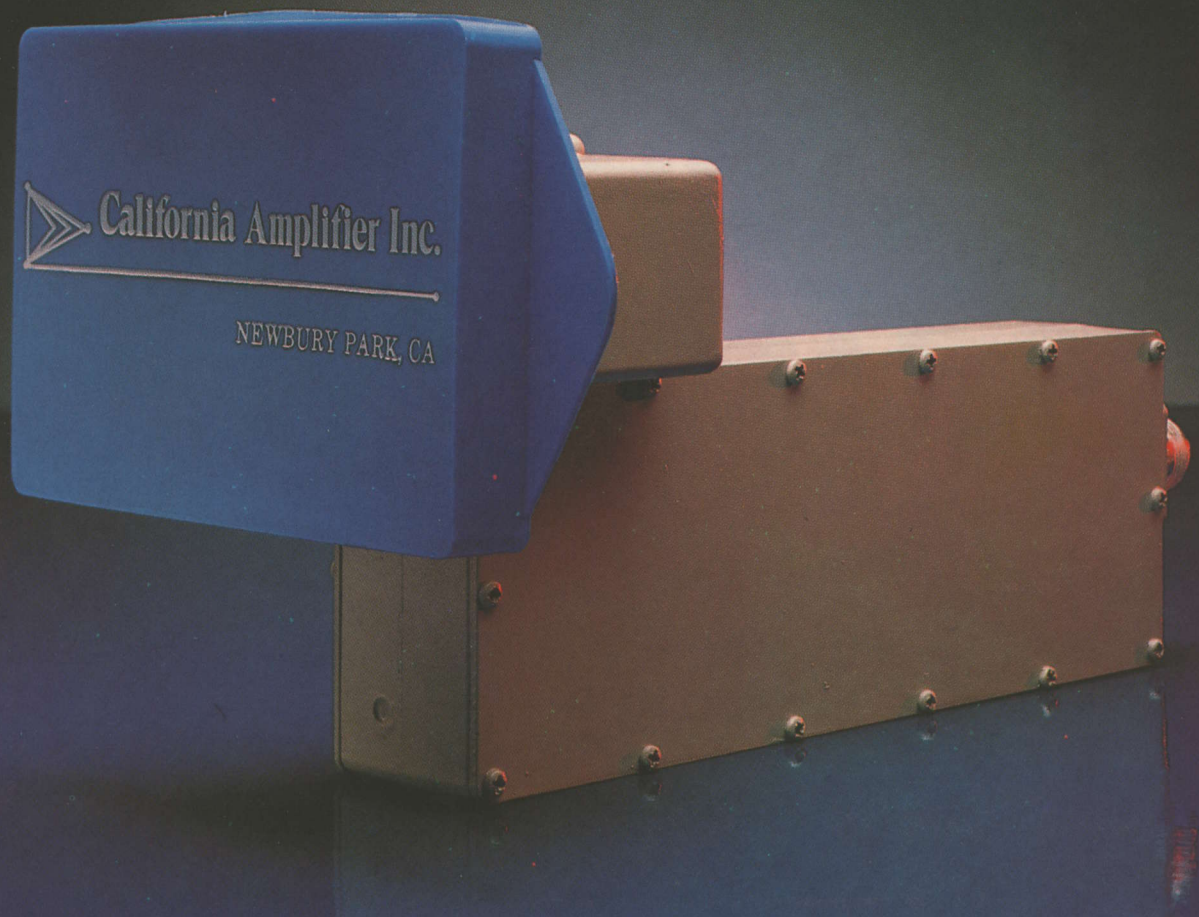
```
5480 DR$ = "DOWN "
5490 MV = 1
5500  IF S0 - SS < 5 AND E0 - EL <
     5 THEN  RETURN
5510  POKE AM + 1,15
5520 MV = 2:SQ = 8:M1 = 0
5530  RETURN
5540  REM  SQ=8 MOVE UP TO ENCOUN
     TER AND PASS MAX SS READING
5550 DR$ = "UP    "
5560 MV = 1: IF M1 > SS GOTO 5580

5570 M1 = SS
5572  IF M2 - M1 > 2 GOTO 5580
5573  POKE AM + 1,15:SQ = 0:MV =
     3
5574  RETURN
5580  IF M1 - SS < 15 AND EL - E0
      < 5 THEN  RETURN
5590  POKE AM + 1,15:SQ = 9:MV =
     2:M2 = 0: RETURN
5600  REM  DOWN TO MAX SS READING

5606  IF EC < 4 GOTO 5610
5607 SQ = 0:MV = 3: RETURN
5610 DR$ = "DOWN ":MV = 1: IF M2 >
     SS GOTO 5630
5620 M2 = SS
5630  IF M1 - M2 > 2 GOTO 5650
5640  POKE AM + 1,15:MV = 3:SQ =
     1: RETURN
5650  IF M2 - SS < 15 AND E0 - EL
      < 5 THEN  RETURN
5660  POKE AM + 1,15:SQ = 8:MV =
     2:M1 = 0:EC = EC + 1: RETURN

5700  RETURN
6000  REM  MOTOR SPEED SET
6010 KK = 14:SE =  - 1:SZ =  - 1:
      REM  SE=ELEVATION SPEED, SZ
     =AZIMUTH SPEED
6020  IF SE >  - 1 GOTO 6040
6030  IF  ABS (EL - ED) < 19 - KK
      THEN SE = ES(KK)
6040  IF SZ >  - 1 GOTO 6060
6050  IF  ABS (AZ - AD) < 17 - KK
      THEN SZ = AS(KK)
6060 KK = KK - 1
6070  IF KK = 0 AND SE =  - 1 THEN
     SE = ES(0)
6080  IF KK = 0 AND SZ =  - 1 THEN
     SZ = AS(0)
6090  IF SZ >  - 1 AND SE >  - 1
      GOTO 6120
6100  GOTO 6020
6110  REM  SETTING SPEED CONTROL
     WORD
6120 SC = SE + SZ: REM  SC=SPEED
     CONTROL WORD
6125  IF DR$ = "UP    " OR DR$ = "
     UP     EAST" OR DR$ = "UP
       WEST" THEN SC = SC - 2
6130  POKE AM + 19,255
6140  POKE AM + 17,SC
6200  RETURN
7000  REM  MOTOR MOVEMENT
7010  IF MV = 0 THEN ST$ = "STAND
     ING BY                ": REM
     MV=MOTOR MOVEMENT FLAG(0-NO
     MOVEMENT,1-MOVEMENT,2-PAUSE,
     3-STOP AND RESET)
7020  IF MV = 0 GOTO 7590
7025  IF MV = 2 THEN ST$ = "PAUSE
                      ": IF MV
      = 2 GOTO 7580
7030  IF MV = 3 GOTO 7540
7035  IF MV = 4 THEN ST$ = "WAITI
     NG FOR SIGNAL          ": IF M
     V = 4 GOTO 7580
7040  POKE AM + 3,15: REM  SET MO
     TOR CONTROL LINES TO OUTPUT
7045 LC = LC + 1
7046  IF LC < 1500 GOTO 7050
7048  POKE AM + 1,15
7049  GOTO 9200
7050  IF DR$ = "UP    " GOTO 7140
7060  IF DR$ = "DOWN " GOTO 7180
7070  IF DR$ = "  EAST" GOTO 7220

7080  IF DR$ = "  WEST" GOTO 7260

7090  IF DR$ = "UP      EAST" GOTO
     7300
7100  IF DR$ = "UP      WEST" GOTO
     7360
7110  IF DR$ = "DOWN    EAST" GOTO
     7420
7120  IF DR$ = "DOWN    WEST" GOTO
     7480
7130  REM  CHECK LIMITS
7140  IF EL > 199 THEN ST$ = "OVE
     R-RANGE UP             "
7150  IF EL > 199 GOTO 7580
7160  POKE AM + 1,11:ST$ = "TRACK
     ING-UP                 "
7170  GOTO 7590
7180  IF EL < 110 THEN ST$ = "OVE
     R-RANGE DOWN           "
7190  IF EL < 110 GOTO 7580
7200  POKE AM + 1,7:ST$ = "TRACKI
```

THE STRONG SILENT TYPE.



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```
     NG-DOWN                    "
7210  GOTO 7590
7220  IF AZ > 220 THEN ST$ = "OVE
     R-RANGE EAST              "
7230  IF AZ > 220 GOTO 7580
7240  POKE AM + 1,14:ST$ = "TRACK
     ING-EAST                  "
7250  GOTO 7590
7260  IF AZ < 110 THEN ST$ = "OVE
     R-RANGE WEST              "
7270  IF AZ < 110 GOTO 7580
7280  POKE AM + 1,13:ST$ = "TRACK
     ING-WEST                  "
7290  GOTO 7590
7300  IF EL > 199 THEN ST$ = "OVE
     R-RANGE UP                "
7310  IF AZ > 220 THEN ST$ = "OVE
     R-RANGE EAST              "
7320  IF AZ > 220 AND EL > 199 THEN
     ST$ = "OVER-RANGE UP AND EAS
     T  "
7330  IF AZ > 220 OR EL > 199 GOTO
     7580
7340  POKE AM + 1,10:ST$ = "TRACK
     ING-UP AND EAST           "
7350  GOTO 7590
7360  IF EL > 199 THEN ST$ = "OVE
     R-RANGE UP                "
7370  IF AZ < 110 THEN ST$ = "OVE
     R-RANGE WEST              "
7380  IF AZ < 110 AND EL > 199 THEN
     ST$ = "OVER-RANGE UP AND WES
     T   "
7390  IF AZ < 110 OR EL > 199 GOTO
     7580
7400  POKE AM + 1,9:ST$ = "TRACKI
     NG-UP AND WEST            "
7410  GOTO 7590
7420  IF EL < 110 THEN ST$ = "OVE
     R-RANGE DOWN              "
7430  IF AZ > 220 THEN ST# = "OVE
     R-RANGE EAST              "
7440  IF AZ > 220 AND EL < 110 THEN
     ST$ = "OVER-RANGE DOWN AND E
     AST  "
7450  IF AZ > 220 OR EL < 110 GOTO
     7580
7460  POKE AM + 1,6:ST$ = "TRACKI
     NG-DOWN AND EAST          "
7470  GOTO 7590
7480  IF EL < 110 THEN ST$ = "OVE
     R-RANGE DOWN              "
7490  IF AZ < 110 THEN ST$ = "OVE
     R-RANGE WEST              "
7500  IF AZ < 110 AND EL < 110 THEN
     ST$ = "OVER-RANGE DOWN AND W
     EST "
7510  IF EL < 110 OR AZ < 110 GOTO
     7580
7520  POKE AM + 1,5:ST$ = "TRACKI
     NG-DOWN AND WEST          "
7525  GOTO 7590
7530  REM  ROUTINE TO RESET CONTR
     OLS AT END OF SEARCH
7540  POKE AM + 1,15: POKE AM + 1
     9,255: POKE AM + 17,255
7550 CC = 0:AC = 0:II = 0:MV = 0:
     SUM = 0:LC = 0: REM  GENERAL
      RESET
7555 SF = 0
7560  RETURN
7570  REM  ROUTINE TO RESET CONTR
     OLS FOR PAUSE AND OVER-RANGE

7580  POKE AM + 1,15: VTAB 9: HTAB
     10: PRINT ST$: FOR V = 1 TO
     200: NEXT V: RETURN
7590  VTAB 9: HTAB 10: PRINT ST$
7700  RETURN
7948  POKE AM + 1,15
8000  REM  DATA ROUTINE
8010  REM  MONTH,DAY,HOUR,MINUTE,
     AZIMUTH,ELEVATION
8020  DATA  8,28,16,6,148,147
8030  DATA  8,28,22,6,152,142
8040  DATA  8,29,4,6,147,146
8050  DATA  8,29,10,6,164,131
8060  DATA  8,29,16,2,148,147
8070  DATA  8,29,22,2,152,142
8080  DATA  8,30,4,2,147,146
8090  DATA  8,30,10,2,164,131
8400  DATA  12,30,0,0,150,150
8500  RETURN
9000  REM  DIAGNOSTIC ROUTINE
9003  VTAB 18
9005  PRINT D$;"PR#3"
9010  PRINT "AZ=";AZ;"  EL=";EL;"
      SQ=";SQ;"  AC=";AC;"  DF="
     ;DF;"  "
9020  PRINT D$;"PR#0"
9100  RETURN
9200  VTAB 9: HTAB 10: PRINT "MOT
     ORS NOT OPERATING PROPERLY"
9210  GOSUB 9000
9220  POKE AM + 2,255: POKE AM +
     0,191
9300  STOP
10000  REM  CLOCKING ROUTINE
```

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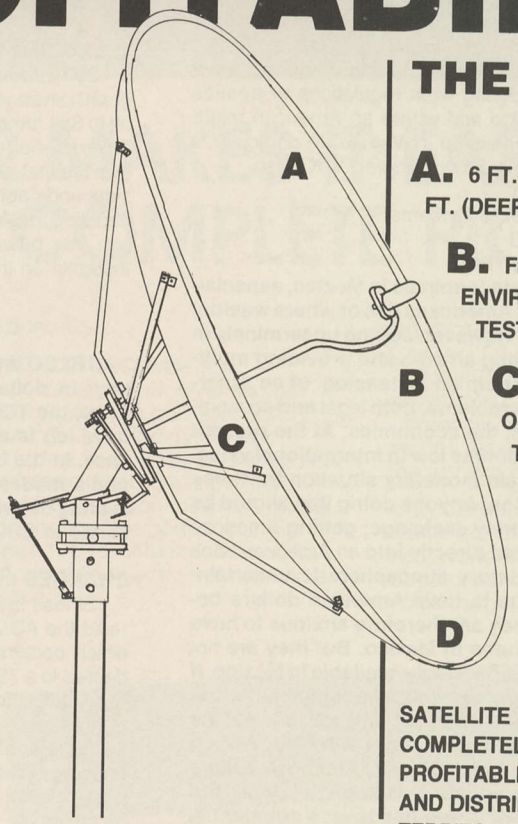

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```
10010 W1 = 191
10020  IF ((H * 60) + M) ( 420 OR
     ((H * 60) + M) ) 896 THEN W1
      = 127
```

```
10400 CW = W1
10410  POKE AM + 2,255
10420  POKE AM + 0,CW
10500  RETURN
```

INDUSTRY AT LARGE

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SETTING Up In Mexico

I am a dealer in satellite TV systems, and appreciate having **CSD** very much. At the present time I average about five systems per month which makes a nice business. However, I have recently returned from a trip to Mexico and could not help but notice all of the 'exclusive' condominium developments, hotels and so on that do not yet have satellite TV reception. I am wondering what regulations or treaties exist between the USA and Mexico and where an American might have problems establishing a dealership in Mexico. In particular, I liked Acapulco and while there only saw a single TVRO dish.

Paul Pullman
Pullman Satellite Systems
P.O. Box 709
Eastland, Tx. 76448

There are thousands of private terminals in Mexico, especially in communities where retired Americans live or where wealthy 'gringos' have vacation homes. However, setting up terminals in condo developments as in cabling an area and providing multiple channel reception, or setting up an 'extension' of an American dealership is fraught with problems; both legal **and** economic, **as well as** logistic. **First of all, the economics. At the present time the Mexican Peso is at an all-time low in international value. This has created a very uncertain monetary situation for those selling American goods for Pesos. Anyone doing this should be careful how they handle the money exchange; getting** American dollars **in** American cash **deposited directly into** an American bank **is a good first step. The regulatory atmosphere is uncertain. Mexican authorities are anxious to have American dollars because it shores up the Peso. They are therefore anxious to have Americans buy homes and condos in Mexico. But they are** not anxious **to have American television widely available in Mexico. If your potential** (condo) **customers take full responsibility for the legal approvals, as and if required, and your only job is to get the system there, installed and working, it might work out. Which gets us to the logistic problems. Mexico wants American dollars but it does** not want **American products crossing the border and dragging Pesos back to the USA. There has been a substantial increase in enforcing existing import laws and before you can haul TVRO hardware** into Mexico **you need the official permission of the** US Department of Commerce, **and, the Mexican authorities. You can try to go around this, but as** CSD **reported for October, they are not playing games on this issue; having sent Mexican air force planes after a pair of US charter planes which were hauling TVRO electronics into Mexico. One of the pilots ended up in a Mexican jail after his plane was shot full of holes and he had to land in the Gulf of Mexico. The best way to avoid all of this is to** (1) **stay** out **of Mexico unless you really are into studying and learning** HOW **to do business there, or,** (2) **getting yourself a Mexican** 'national' **as a partner. Then your only problem is being certain your partner doesn't get to you financially. Maybe it makes more sense to increase your marketing efforts and sell 7 terminals a month** in Eastland **rather than 5!**

TELCO QRM?

Sorry about the demise of **Sat-Scene;** the Coop interviews were great! I know you are busy just getting back from England and heading off to Sri Lanka but wonder if you could consider doing some pieces on Telco interference. My experience with amateur radio SSB and theory tells me that notching out Telco carriers would be useless if the Telco sidebands appear within the receiver passband. Since **CSD** is now handling the **ASTI Handbook,** I imagine the Telco interference problem has been cussed and discussed quite a bit. What are your thoughts on the subject?

Kermit Slobb
1605 Oakwood Road
Northbrook, Il. 60062

TELCO interference can be **eliminated but there is a price you pay; in dollars and reception quality. Carefully and properly done, the TELCO carriers can be taken away and what you will have left is at least a watchable picture. That's the near-worst case. In the best cases, the Telco interference is not so severe and a modest amount of filtering seems to clean it up without leaving behind any objectionable residue. We'll try to schedule a series in** CSD **on the subject in the new year.**

CHANGES In Curacao

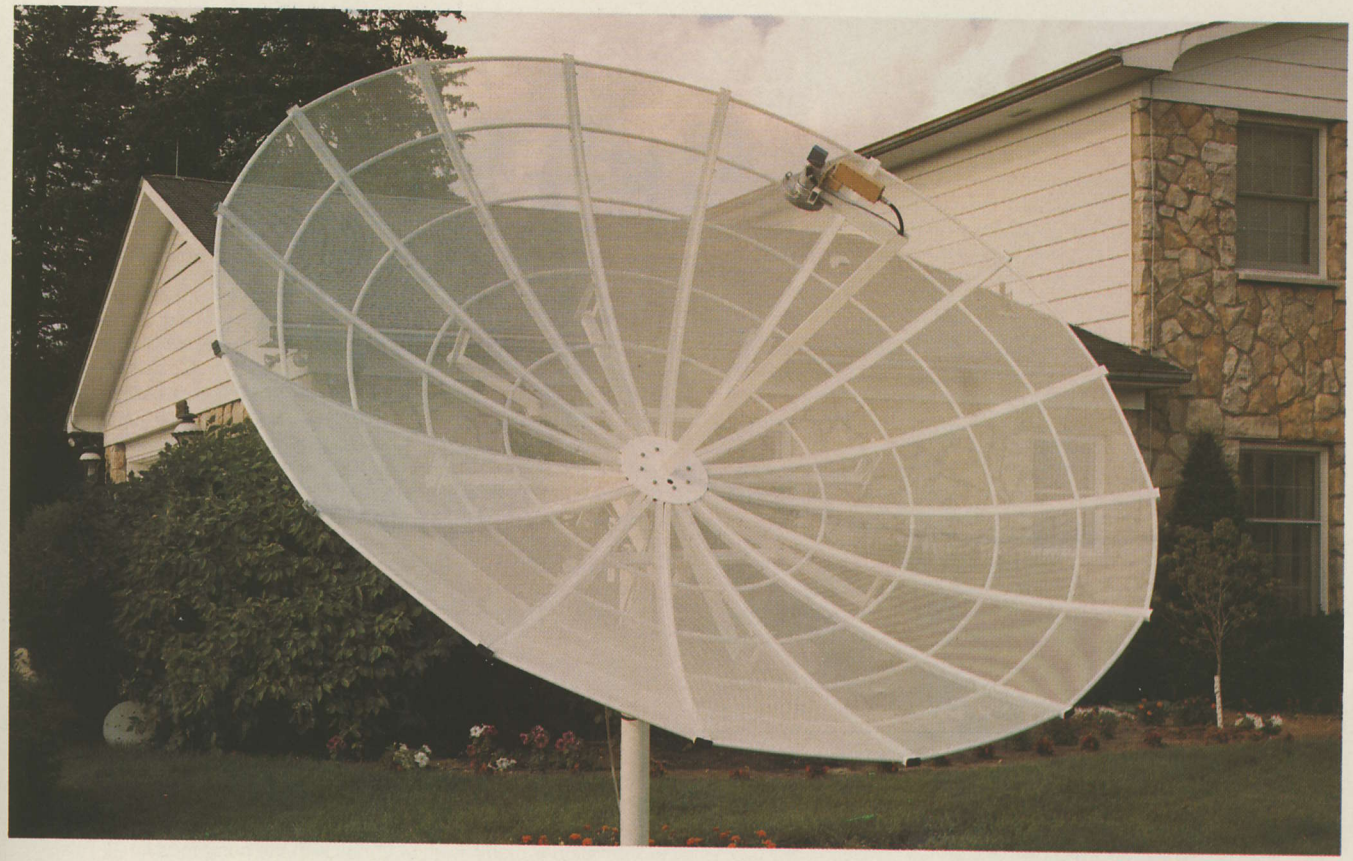
Since I last reported I have made some changes in my system. I redid the ADM 20 foot antenna, closing up some of the panel gaps which occurred with my installation of the dish, went from an 85 degree to a 75 degree California Amplifier LNA, and switched from an Automation Techniques receiver to an AVCOM COM-3R 'international' grade receiver. I also changed my cable from 18 feet of RG-213 to an equal length of Heliax® cable. The only thing I may wish to change out now is the feed system, I am using a Chaparral Polarotor at the present time. The net result of all of this is that I now have far better reception.

Galaxy One at only 11 degrees look angle. Reception on transponders 6, 20 and 21 is flawless. Absolutely perfect!

F3R. I now have reception with no noise or any degradation on transponders 3, 4, 7, 11, 15, 19 and 23. I also have perfect reception except on bright colors (where there is a slight break up in the colors) on transponders 8, 12, 16, 20 and 24. The remaining transponders are viewable, **except for** WTBS.

W4 and W5. All transponders are now totally clean on all feeds. I am located at 12 degrees north, off the coast of Venezuela.

Golden Watch Optica Kywi. N.V.
P.O. Box 2053
Breedestraat 11 (0)
Curacao, N.A.



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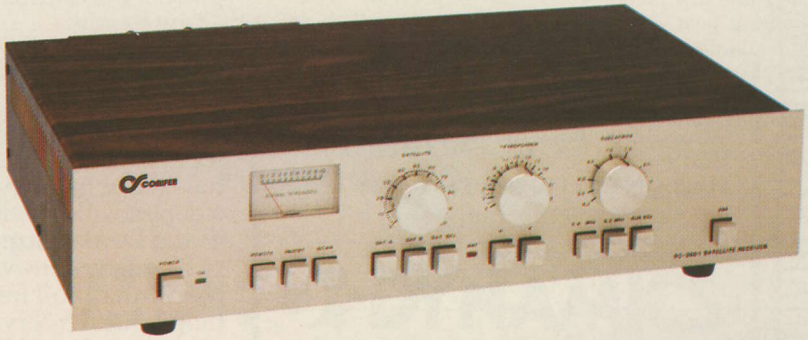

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It is amazing what a good **system will do, even so far south and east. See if you can get that dish** down **to F1R to check the signal on TR20 from AFRTS. We find that for those who have a look angle that works, in the Caribbean, the F1R signal is at or above** even those from F3R's hot vertical side.

A PAIR OF HANDS

I have found **CSD** immensely helpful and interesting since first learning of the industry. I have through the years been involved with several other industries, both established and emerging but none had a trade magazine such as **CSD;** none that even remotely compare to **CSD.** Also, none of these industries had an individual with the care and concern for its growth and success, willing to act as a spokesman and mediator. Nor do they have anyone with your integrity and willingness to point fingers at the problem areas without fear of losing friends or advertisers. My compliments to you!

I recently talked with **CSD**'s Carol Graba regarding the Sri Lanka expedition and have signed up for the trip. While I am certainly not one of the industry leaders, and I do not possess any great technological knowledge, I would like to be able to attend as a very interested representative of the many-many small dealers trying to build the TVRO market. I would hope that with the large amount of work required and the limited six day period in Sri Lanka that having an extra pair of willing hands would be helpful. I also plan to attend the SPACE convention in Orlando in early November and hope to meet others who are going to Sri Lanka as well.

Thank you for the inspiration and knowledge I have gained from **CSD;** please keep up the good work.

Richard R. Lowman, III
Berkeley-Sunwood Satellite Antennas
Martinsburg, W. VA 25401

We look forward to having your helping hands in Sri Lanka. Getting three satellite antennas installed in six days, in a hot equatorial climate under perhaps difficult conditions will be quite a chore. We intend to break up into 'teams' with some added assistance from some people Arthur C. Clarke will have available. We look forward to seeing you **in Orlando as well.**

TVRO In Nepal

I have been a TVRO owner for several years and have been an avid reader of **CSD** for almost as long. At the present time I am working with a Hong Kong-based investment company specializing in the importation of new technology. Recently I found myself in the country of **Nepal** with a 12 foot LULY antenna. We were hoping to pull in the new Palapa 'B' satellite or perhaps AFRTS off of Intelsat. Intelsat proved to be out of our available look range and either Palapa 'B' was not yet on the air when we were there, or, it is simply not going to put a usable footprint into Nepal. I hope the former was true since they had been off the pad only two weeks when we were there. However, we did run into a pretty reasonable picture from a Russian bird at 85 east; a **Raduga** satellite. There we found both a Russian internal television service plus the leased channel service in use for India. We were using an AVCOM 3R receiver and an 85 degree LNA.

While there we met a Mr. Hari Shrestra who works for the US Embassy. He has built himself a small dish and with it he is receiving the Russian Ekran telecasts on 714 MHz.

Currently we will be cooperating with a Nepali company to build low-cost spherical antennas and to manufacture low cost receivers from component form to receive the Indian TV transmissions on 2.6 GHz. We are also negotiating with the Government of Nepal to establish (the first) television station here. I am very interested in the type of system Coop has operating in the Turks and Caicos Islands and would like to do something similar in Nepal. Conversely, French and Japanese firms have submitted bids to construct high power traditional television systems here but I feel with the numerous small villages that the low power approach makes more sense.

In connection with the TVRO industry trip to Sri Lanka, I would like to go along and join the group in Hong Kong as they 'pass through.' I have long been a fan of Arthur C. Clarke's books and am an out of practice scuba diver as well (one does not have much opportunity to dive in Nepal!). At a later date I would like to come to the Turks and Caicos to study the WIV operation first hand.

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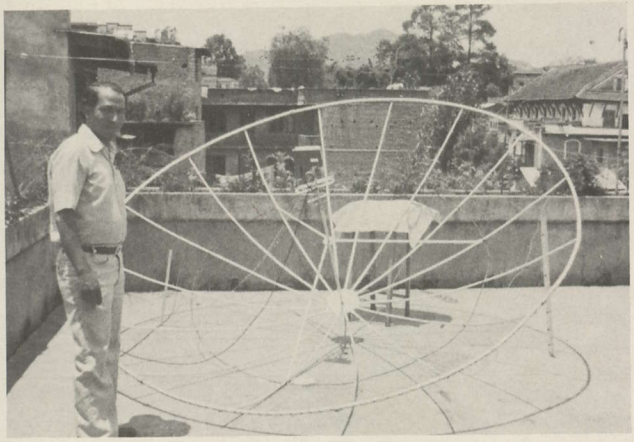
ALL INDIA TV (newscast) as received on Luly 12 foot dish, 85 degree LNA and AVCOM 3R receiver from Russian Raduga bird at 85 east.



HARI SHRESTHRA and his home built EKRAN antenna in Nepal. Note the signal booster for the 714 MHz signal on the dipole antenna.

IN ENGLISH / Russian news on Ekran satellite using 714 MHz downlink frequency, received on system of Hari Shresthra in Nepal.

Anyone who has hauled a 12 foot LULY antenna and associated electronics half way around the world, to Nepal, **certainly qualifies for a trip to Sri Lanka. See you in Hong Kong!**

HELP US Sell In The Caribbean

We would like to request some information for residential satellite TVRO systems in the West Indies, ranging from Nassau south to Trinidad. We are a TVRO dealership, located in Toronto. There are many people from the West Indies who have business dealings back and forth between Canada and the various islands. Several have approached our firm in order to arrange and possibly establish some dealerships in the islands.

In Toronto we need a 10 foot dish with a 110 degree LNA to get sparklie free reception on even the weakest channels. With an 8 foot dish and a 100 degree LNA, we receive about 80% of the transponders noise free while another ten percent have a very minimal amount of noise.

It was suggested to us by one company that for "good" reception, you could use a 12 foot mesh dish as far south as Nassau. A 16 footer was suggested from there south to Puerto Rico. A twenty footer was suggested from Puerto Rico south to Trinidad. All of these were with 100 degree LNAs, and an 85 degree LNA was suggested for Trinidad. Yet another company said their 16 foot mesh antenna and a 100 degree LNA would provide good reception as far as Puerto Rico and moderate reception as far as Trinidad. Yet another firm told us a 25 foot dish would be required for Trinidad.

What we need are more **exact** answers. What do we need for "good" and "moderate" reception in the various latitudes through the islands, and what LNAs? We are trying to determine what is a good picture, for reference, and what is the **smallest antenna** that could be used for private residential purposes.

Finally on the subject of Intelsat satellites: Can the same antennas also be used to pick up the Intelsat satellites? Are they in the same arc as the North American satellites? How many Intelsat satellites can be picked up? How many transponders and what language programming? What is required in the way of different equipment for Intelsat?

Michael J. Ryerse
International Satellite Telecommunications, Corp.
110 Norfinch Drive, #6A
Downsview, Ontario
M3N 1X1, Canada

A full and complete answer to all of your questions would fill a book. In fact, as luck would have it, there is **a book dealing with many of your questions. Try** STTI, P.O. Box G, Arcadia, Oklahoma 73007 **where for $30 (American) you can purchase the (Steve)** Birkill International Satellite Manual. **Discussions of this size dish and that noise figure LNA are totally meaningless in the Caribbean for a number of reasons. First of all, there is a wide variation in signal levels between any two satellites, and within any satellite, between transponders, in the Caribbean. You MUST determine how MANY channels of reception the customer will accept before paying you money for an installation. If 20 'good channels'** (good to us means no objectionable noise in the video or audio) **is adequate, a** QUALITY **12 foot dish will play all the way from Nassau to Trinidad.** But **the customer cannot select** which 20 channels **are good. Six will come from F3R, another five to six from W5, three or four from W4 and the balance from F4. It may turn out that the channels the customer most wants will not be good; they may not even be visible on a 12 footer. Even on those 20 or so channels, the dish must be as perfect as technology permits; the LNA must be no less than a true 100 degree unit, and the receiver must be exceptional. Too often people are fooled in the Caribbean because a few** (very few) **of the signals are almost as strong in Trinidad as they are in Alabama or Toronto. From that observation, people make claims for antennas, LNAs and receivers which leads you to believe that** almost **anything** will work **there, or, that reception is uniform from channel to channel as it**

CORRESPONDENCE continues/ page 78

Get the ASTI Handbook And Kiss TI Goodbye!

What Is ASTI?

Terrestrial interference (TI) is fast becoming a major economic consideration for the installers and operators of TVRO earth terminals. Thousands of dollars, even hundreds of thousands, may be at stake when the earth station is turned on — only to discover that TI is degrading or altogether preventing reception of desired satellite signals. At this point, conventional wisdom used to advise packing up and moving to another site. But now, with many of the available TI-clean sites already taken, and with the advent of a huge and still growing transcontinental microwave telephone relay system, finding another site can be impractical if not impossible. Consequently, most dollar-conscious installers and operators would rather stand and fight TI than switch to another site.

The purpose of this volume is to integrate two practices — avoidance and suppression — into a logical, unified approach that can be effectively applied in the planning and installation of any TVRO earth station system. Conscientious application of ASTI — the avoidance/suppression approach to eliminating TI at TVRO earth stations — will reduce the possibility that TI will be discovered at turn-on, enhance the probability that unavoidable TI can be eliminated, and increase the effective operating quality of the TVRO system.

The authors of this handbook, with years of experience as designers of RF and microwave filter networks, have had ample opportunity to test the ASTI approach—it works! Measured over a period of time, the costs involved in the ASTI approach have proved to be substantially lower than any alternative, especially in terms of dollars saved when the initial site was made operable. Furthermore, both cost and complexity of filtering to eliminate TI are lowered considerably when all essential aspects of the ASTI approach are conscientiously employed.

Contents Include:

The TI Avoidance/Suppression Approach; Why Satellites; How Your Earth Terminal Works; TI Sources; TI Symptoms; Selecting the Antenna for Least TI; TI Susceptibility of Other TVRO Components; How to Select a Site; The Pre-Installation Site Suvey; Defensive Installation; Use of Artificial Shielding; Filtering the TVRO; Filtering Special TVRO Systems; SMATV Techniques; Standard TVRO and Satellite Data; Formulas and Derivations...

About the Authors:

Glyn Bostick is the founder, president and chief engineer of Microwave Filter Company, Inc. He has been designing filters for the suppression of interference in cable TV systems, industrial and defense communications equipment, and satellite earth stations since 1967. Mr. Bostick has written a plethora of technical articles for trade publications, holds several patents and is a senior member of the IEEE.

John Fannetti is MFC's senior technical consultant and head of the company's new Field Service Division. He has 30 years of engineering and earth station troubleshooting experience, including 7 years as president of JDF Communications, a CATV consulting and TVRO installation firm.

William Johnson, chief engineer of research and development, is MFC's "voice" and travels around the country, upon request, to deliver ASTI-type lectures at various industry gatherings. In his technical capacity at MFC, Mr. Johnson is the design engineer in charge of special developmental projects. He earned his BSEE at Syracuse University and is currently engaged in graduate studies there.

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FROM sun noise outage to a look at the first private terminal receiver product ever offered for sale (1978!); from the first experiments by pioneer Oliver Swan leading up to the development of the Spherical antenna design, to the sleek, sophisticated motor driven spaceage terminals of today. Everything that ever happened in this young, dynamic industry worth reporting is covered in detail and depth in this 1,000 (plus) page 'Textbook'!

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CORRESPONDENCE/ continued from page 72

is in the continental region. Not so and best you find out for yourself before **designing and selling any systems to anyone in the Caribbean.**

SMATV Battle In Minneapolis

I am enclosing a copy of an article found in the Minneapolis Tribune for August 26th. I have also sent a copy to Richard L. Brown of SPACE and I hope that this is handled in a manner which is beneficial to the consumers who so much want and need this service.

Steve G. Fink
1309 7th Street S.E.
Minneapolis, Mn. 55414

The newspaper report tells of a satellite firm operating in Minnesota and Wisconsin that is currently delivering The Movie Channel **to 11 apartment complexes in the Minneapolis area,** without **a contract with Warner Amex. The operator of the company said he wrote to Warner Amex for permission to carry the service and was not told he could** not **use The Movie Channel. He also admits that he was not told that he** could **use the service either. The operation claims to have around 6,000 subscribers in the Minneapolis area. Warner Amex is taking legal steps to have the use of its programming halted.**

HELP IN India

I have some enquiries which perhaps somebody can help me with. On page 80 of **CSD** for April, there was a report that a group of satellite people were traveling to Sri Lanka to visit Arthur C. Clarke and to install some satellite terminals there. This tells me that since Sri Lanka is at the southern tip of India, that the satellites that can be received in Sri Lanka will also be able to be received here. I must also assume from the article that a high quality 20 footer antenna will produce quality reception. I would like to purchase a twenty foot antenna, if that is the size required, and the necessary electronic attachments to have satellite reception here in India. Can someone give me advice on what equipment to order and who to order it from?

Mukesh Tandon
20, Belvedere Road
Calcutta 700 027
India

On November 17th, the group of approximately 20 will be leaving San Francisco heading for Tokyo, Hong Kong, Bombay, Sri Lanka, London and back home again. Along the way we will be visiting TVRO designers and installers at almost every stop. Unfortunately, Calcutta is not one of our stops so we will not be able to help Mr. Tandon, directly, with his ambition to own a TVRO in India. Perhaps one or more readers, active in the international **satellite field, could contact him with literature and a quotation for** equipment.

TURN INTO A Cinder

I noticed, with some surprise, the letters concerning the use of a parabolic dish for the collection of solar energy. I have been in the solar field for some 18 years and have seen and heard of many strange devices. There are reasons for flat plate collectors and reasons for parabolic trackers; i.e., the flat plate will work on a cloudy day and the parabolic will not. The Chinese idea will probably still put out some power if you can see the 'shape' of the sun through the cloud cover.

In this area at 9,000 feet elevation, I usually design a system with 50 square feet of flat plate with a 120 gallon water tank. This would never work in the flatlands (such as Kansas) because of the water vapor, smog and so on in the air. Our solar insolation can run in excess of 310 BTU/Hr/per square foot, which is a bunch. A 13 foot dish is therefore capable of delivering 15.6 HP if 100% efficiency could be obtained. This is one of the reasons why I bought one of Jamie Gowen's fine ADM dishes; when they scramble all of the birds I can strip and polish the dish and have at it. Possibly a water cooled Rankine, or as the man mentioned, a very efficient turbine???

However, the primary reason I am writing concerning this matter is the fact that an optically polished parabolic dish is the 'fire' for an

'external' combustion engine. One mistake, and you are either blind or a cinder. For fine tuning such a system, it is far safer (and saner) to point at the full moon with the dish for tweeking. With the moon, there are no 'terminal side effects.'

Finally, optical trackers are a standard item in solar or the astronomy fields. 'Zomeworks' of Albuquerque, NM makes a very neat freon powered tracker where the freon leaves the hotter of two cannisters to transfer to the cooler one. By weight shift, this causes it to track the sun and was designed for use with solar PV panels.

J. Robert Williams
Solar West
P.O. Box 547
Crested Butte, Co. 81224

Williams speaks the truth. An article, prepared by the fellow who is playing with polished parabolic dish surfaces and the sun, appears in this issue of CSD. **Being a cinder might be the more pleasant result of an accident;** flash burning **can be a pain that stays with you for life. Best to keep the dish, any dish, away from the region of the sun.**

UTAH Attorney General

I have recently become more and more alarmed when I see in print, whether in trade publication advertisements or in flier sheets distributed internally within the trade, antenna claims which are so far out of line that nobody with any background at all in antenna system design would even attempt to defend them. For example, there are two firms headquartered in Utah who persist in sending out flier sheets extolling the virtue of their various antennas. Allow me to show you some numbers which these sheets claim:

8′ antenna = 41 dB gain
10′ antenna = 42.5 dB gain
12′ antenna = 44.06 dB gain
16′ antenna = 47.01 dB gain

Now, just for the record, if these gain figures were accurate, the various antennas being touted would have achieved an amazing degree of 'gain efficiency.' I hope that most **CSD** readers are aware that the maximum antenna system (not feed system) gain one is likely to attain with a production model antenna is 65%. Some claim a tad more, but it is not a 'tad' we are dealing with here. If a 65% efficient antenna is a superior antenna (it is), what do the numbers quoted above reflect?

8′ antenna = 122% aperture efficiency
10′ antenna = 110% aperture efficiency
12′ antenna = 117% aperture efficiency
16′ antenna = 119% aperture efficiency

What is bothersome about all of this is that we are all trying to sell our (antenna) products to a dealer-level buyer who is largely uneducated in antenna gain parameters. He doesn't KNOW that you can't have an antenna that is 122% efficient. As far as he is concerned, such an antenna is simply 'better than' those that stick to honest gain statements. Without any background, he is apt to send off his money and expect to receive an antenna that will perform miracles for his customers. If the dealer has some financial backing, he may survive these early 'mistakes.' If not, we lose another dealer from the fold because he is stuck with something that will not perform as advertised, and the poor dealer doesn't know what is wrong. He just leaves the business, never to be heard from again.

The pair of Utah firms really irritate me since they have been told of their dishonest claims and yet they persist to publish them. Accordingly, I have taken the matter to the attention of the Utah Attorney General (through Neal T. Gooch, Utah Attorney General's Office, 236 State Capital, Salt Lake City, Ut 84111) and I have filed a complaint against these two firms with supporting documentation. I hope that others who understand how antennas work and why such claims are bad for the long term viability of our industry will take similar stands when they see such fraudulent advertising practices.

Doug Dehnert
President
United Satellite Systems
St. Hilaire, Mn. 56754

Bravo! If you are a dealer, or distributor, or OEM and you find yourself getting cut short of sales because someone out there is

hyping equipment specifications that you know cannot hold up under close inspection, we suggest you take the same lead as Doug and bring the matter to the attention of the Attorney General in the state where the firms headquarter. It may not shut them down, but it could force them to re-evaluate their advertising statements!

A START

Can you supply any information on Direct Broadcast Satellite transmissions to this part of the world? I have a receiver from Electronic Rainbow.

P. Robinson
Proliam Ltd.
P.O. Box 282
Kalulushi
Zambia

There are no 'DBS' transmissions to that part of the world. However, your Electronic Rainbow **receiver is a 3.7 to 4.2 GHz band receiver and it is** not **a DBS receiver anyhow. With a 16 to 20 foot dish, you could receive around eight Intelsat transmission video channels from Atlantic region birds and another four from Indian Ocean birds. You would also have reception from the Russian Gorizont bird at 14 west and the Russian/Indian bird transmissions from the region of 85 east. Mr. Robinson needs some advice and assistance from those who have a feeling for reception possibilities in the east of Africa. His address appears above.**

WEATHER Interest

All I can say is WOW!!!!! I have received two or three calls a day about our WEFAX receiving systems for the last several weeks. I finally called your office and got a copy of **CSD** for September sent up here. After reading the front cover story on our GOES/WEFAX gear, I have to admit that I was very pleased. We have prided ourselves in building a reliable system and it apparently has paid off. For example, after hurricane Alicia hit the Texas coast a system in Galveston was back on the air in five days (they spent the first four days replacing the roof and walls on the building!) and another system in Houston was back on the air the next day. In the case of Houston, the winds lifted the anchors holding the antenna to the roof and laid the antenna over. All they had to do to get back operational was upright the antenna.

In response to your editorial criticism concerning the completeness of our manual, we are now producing a custom manual using our Osborne I Word Star, for each of our systems. The manual does include antenna instructions and AZ and EL for all of the satellites with WEFAX data. The manual is up to 90 pages now and includes a loose leaf schedule for the WEFAX transmissions.

Noel J. Petit
Northern Video Graphics
Suite 220B, 511 11th Av. South
Minneapolis, Mn. 55415

We had hoped **that there were readers who would profit by knowing about the availability of the commercial WEFAX/GOES packages and are delighted to learn we were right. As our industry does mature, dealers with the sophistication to** 'branch out' **in related satellite system areas will find there is more to satellite system sales than tuning in Mickey Mouse.**

SMALL DISHES Found

I am writing this letter to update you on the situation regarding Southeast Satellite Distributors. I wrote to **CSD** (see **CSD** correspondence, October 1983) regarding a display-size satellite dish which I saw at the Las Vegas STTI show. After months of telephone calls and letters, I was unable to get delivery on the two small display dishes.

I finally did reach Robert Davis who is in charge of the firm. He told me that there had been a problem with some of his employees and after he discovered this he discharged them. Sure enough, within a few days we did receive the two dishes. We were able to get our logo painted on the dishes just in time to use them at our display at the largest regional Fair of the season.

We have learned a lesson here, however. In the future, when I

order something from a firm that I do not know, I will only order COD. After I have done this for a couple of orders, and everything has been OK, then I will consider sending payment in advance. Since we first saw the antennas displayed at a satellite show, we felt comfortable with the firm. However, we later learned that the display was not authorized and that the operators of the show did not even know the people were there displaying. That is our second lesson; if we don't find the display listed in the program, we will be extremely careful about ordering anything except on a COD basis.

Judith A. Showers
Carlisle Radio & TV Co., Inc.
2 Spring Road
Carlisle, Pa. 17013

Two valuable lessons. However, just because a firm is listed in the program of a show is no guarantee **that you will not have delivery problems. Ordering COD from** any **new firm is a good approach until the firm is established well enough that they are not going to fold on you while they have some of your money and you don't have the equipment you have paid for.**

GETTING TOGETHER In Orlando

Our company was formed back in '80 after the Houston STT show. I personally have been following the industry since the **TV GUIDE** article written by Coop, and before.

I read in the September **CSD** that you are getting up a program at the Orlando SPACE show for those dealers who work in the Caribbean. Starting about seven months ago, we have been selling complete terminals in the US Virgin Islands, the British Virgin Islands, and closer to home, in the Bahamas. We also have contracts pending to do installations in Trinidad (an ADM 20 footer) and in Guatamala.

We use, exclusively, the 12 foot Paraclipse dishes, Dexcel 1100-02 receivers and the Tracker 3 Remotes. So far only 1 Tracker has been a problem. In this case the owner went 'down islands' for a few months and when he came back the drive was frozen up. We went back on some additional installs and found the shaft was not frozen afterall; it seems the motor had stopped on a 'bad spot' and was not getting juice. After moving it by hand a turn or two it worked just fine. On the other side of the coin, we have found that the Paraclipse antennas will not hold up in a heavy salt-air environment. We have been painting all of our installations but the steel mount simply will not last.

The dish does perform exceptionally well when put together properly. We have run across Paraclipse dishes put together by people who wanted to do it themselves and as a rule they never look as good (or perform as well) as they can when they are 'tweeked.' In the British Virgin Islands the hot verticals (3, 7, 11, 15, 19 and 23) are totally clean, and 4, 8, 12 and 24 are just below threshold. Everyone down there we have sold is delighted to have 20 to 30 'excellent TV channels,' by their standards.

We intend to attend the Orlando gathering and look forward to meeting others who live or work in the TVRO field in the Caribbean, Central and South America.

Rowie Percoco
Satellite TV Services, Inc.
4213 Bee Ridge Road
Sarasota, Fl. 33582

On Saturday morning, November 5th, at 10AM, there will be a special **seminar session at the SPACE gathering for those who have an interest in Caribbean** (etc.) **TVRO installations. The sessions will be held** 'forum style' **with plenty of opportunity for everyone attending to express their thoughts. We are even going to** attempt **to do it bi-lingual** (English and Spanish) **so that nobody misses important points. There will also be a demonstration or two of some new hardware for off-shore installations.**

TRANSPONDER WATCH

RECENT REPORTS OF ACTIVITY ON DOMESTIC / INTERNATIONAL SATELLITES

Send your reports to CSD Transponder Watch, P.O. Box 100858, Ft. Lauderdale, FL 33310. For late news, call (305) 771-0505.

CUBA'S announced plan to insert domestic satellite on 4 GHz at 83 west has US officials researching international 'rules' and agreements. Surpirse. US has not always followed rules and agreements and as many as 40 US satellites may be 'illegal' in international eyes. SATCOM F4 at 83.5 west is one of those.

COMSAT is getting increased heat in Congress. Under attack is monopoly position of firm in number of areas. Heading up push to get COMSAT into same 'divested' mode as AT&T is M/A COM.

FUELING fires facing COMSAT is latest annual report; in most recently completed full year, Intelsat grew by increasing amount of 'traffic' carried 23% while revenues jumped 27%. **COMSAT owns** largest single chunk of Intelsat.

ORION, who would compete with Intelsat on cross-Atlantic route if FCC will approve plan, found number of points in annual Intelsat report which seem to be contrary to statements made to FCC by Intelsat concerning 'dangers' to Intelsat if Orion is granted FCC approval.

INDIAN INSAT-1-B had narrow escape. After initial launch, satellite developed problems, was refusing to unfurl solar array. Very nervous ten days followed while satellite was given ground commands to try to get stuck powering array to release. It finally did but not before builder Ford Aerospace suffered considerable PR problems and Indians began reminding world that similar problem rendered Insat 1-A useless only year ago. New satellite includes 2.6 GHz DBS service for Indian television as well as 4 GHz communication circuits and complicated weather sensing systems.

POSSIBLY because of Cuban application to install domestic satellite at 83.5 west, in conflict with F4, Cuban request for time on Intelsat for direct coverage into Cuba of 1984 Los Angeles Olympic games has been approved. At first, Intelsat told Cuba no time was available. Cuba then went to Robert Wold Company to request time via US domestic satellite(s) to forward coverage of games **directly** to Cuba. Wold ran into stone wall at US Department of State on issue which opposed use of US birds for 'legal' direct service to Cuba. Intelsat finally juggled commitments and found time Cuba was requesting. Games will now go from LA to east coast Intelsat uplink on domestic bird, shoot east to Intelsat bird over Atlantic, come back to Cuba via Intelsat. Whether Cuba will **actually** set up to take long-haul Intelsat feed, or merely 'tune in' to US domestic service headed their way on US domestic bird, is moot point. Cuban leader Castro has own terminal, is regular viewer of US services such as CNN.

GERMAN would-be satellite launching firm, ORTAG, is back in news. Firm has been mystery builder of rockets for some years, usually is considered clandestine German industrial effort to get into

rocket/missile business. Latest shot was attempt to launch rocket from Sweden. Rocket came apart seconds after launch destroying payload on board.

BATTLE between Western Union and FCC shaping up; WU challenges manner in which FCC granted 9 licenses to firms such as Hughes, Rainbow, RCA, GTE Spacenet and others. WU contends that FCC did not follow normal procedures, should have held 'comparative hearing' between applicants to determine which applicants were best qualified to serve public good.

GENERAL INSTRUMENT plans to create a 12 GHz **'business** DBS' for delivery of data using 1.2 to 1.8 meter dishes. Cable systems might be part of the deal, distributing the broadband business DBS data within cities on coaxial lines.

TRANSBORDER approvals, allowing various firms to utilize US domestic satellites to transmit communication services to nearby foreign points, have been approved by FCC. Included in most recent batch: CBS television service to Bermuda affiliate; Trinity Broadcasting's KTBN to the British Virgin Islands (F4, TR17); Reuters news to Canada, as well as the Caribbean and Bermuda (TR18, F3R); Muzak via Westar to Canada and Mexico; WOR/WTBS/ESPN/Nickelodeon and others to Dominican Republic; ACSN (TR16, F3R) to approximately 30 countries in Caribbean, Central and South America.

BRIGHTSTAR COMMUNICATIONS is new venture of Western Union and London based VISNEWS. Firm has leased transponder on Intelsat at 1 west, uses it to haul American news and sports to Europe with up to 6 hours daily (TR8). Service goes via WU satellite from New Jersey to Maine, then directly to London headquarters of VISNEWS.

MURDOCH'S Satellite TV PLC has announced that 12 GHz ECS-1 service in English will be carried by new cable systems in Munich and Ludwigshaven, (W) Germany by 1984. See report on **CAST '83** show this issue of **CSD.**

USCI, pioneer 12 GHz DBS firm, will distribute hardware to installers via 80 locations operated by national telecommunications marketing firm Anixter Bros.

INTELSAT has announced plans for international business connection service, offering to connect firms between west coast of USA and points in Middle East/Europe/Africa together. Small dishes, lower rates are planned making IBS (International Business Service) extremely competitive. Basic rate, less cost of earth stations, will be $500 per month to cross Atlantic with data-width channel.

SPREAD SPECTRUM tests, using technology similar to that used by TR18, F3R Reuters to send slower speed version of full Reuters Text service, have been completed by Italian group with Intelsat. They found that small two foot terminals will work even using Intelsat birds.

ABC claims they were first (US) network to make use of Ku band satellite for news delivery. With Microdyne portable terminal, network covered Cape launch of shuttle late in August via SBS-3 satellite.

ARIANE launch schedule, through fall, has slipped. Delays of several weeks likely for launches through early 1984 because of problems getting delivery on required spare parts.

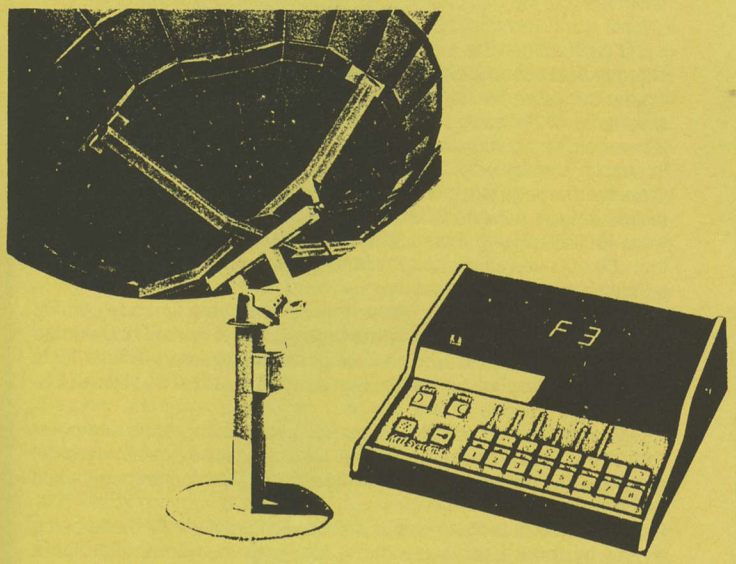
COMPETITION for Satellite Television PLC, in Europe, from another English firm loosely associated with British IBA group. They plan up to 5 hours of English language TV nightly, via ECS-1 bird, using transponder reserved for Netherlands. Service would be commercially sponsored.

RCA claims that traffic carried on failing F1/F2 birds at 119 west will be shifted to recently launched F2R at 66 west. F1/F2 combo flight has had share of problems including loss of all horizontal transponders on F2 so that presently duo-birds in same location share by sending vertical programming/transmissions through F2 part and horizontal through F1 part.

CANADIAN CANCOM firm, responsible for selection of Detroit CBS/NBC/PBS stations for feed to Canadian cable systems via scrambled ANIK D service, explains that Detroit US network affiliates were chosen for relay purposes primarily because Detroit stations do not accept Canadian advertising. Other US border TV affiliates often do carry Canadian advertising and that had bothered Canadian authorities. ABC service, earlier planned to come from Seattle station, will now come from Detroit's ABC outlet and will be added 'soon.'

ABC, failing to achieve west coast feeds via US domestic satel-

The best system for the money



The heavy-duty X mount (for the Prodelin dish) is designed from the bottom up, so that it can track the geostationary orbit with ease. Hyme joints, with fully-adjustable declination (3 to 8 degrees) and simplicity of style, offers easy installation and years of carefree service when coupled with the unequaled, completely programmable MTI 2100 antenna positioner.

Complete systems to dealers with Locom LNAs, Chapparal Polarotor, and a choice of Locom, MTI, Drake or Luxor receiver.

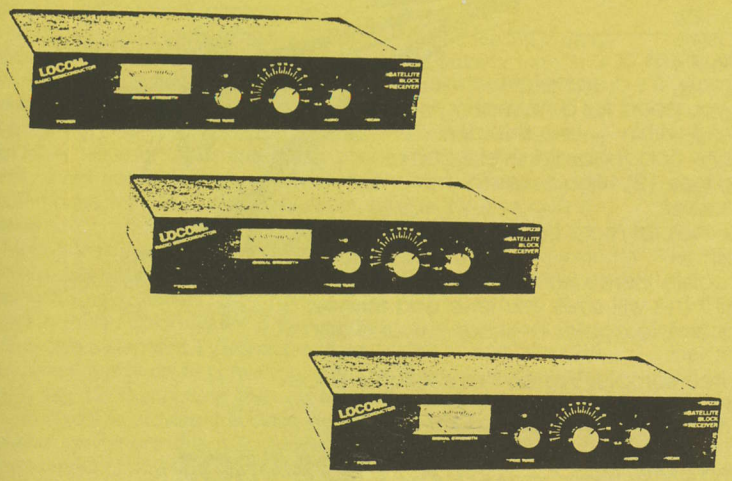
The Satellite Man

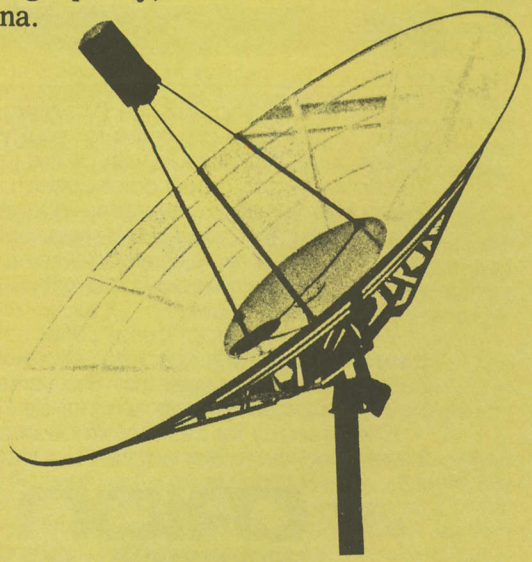
5903 E. Pima • Tucson, Arizona 85712 • (602) 721-2485

Why can't my neighbor and I share the same dish?

Now you can!

It's a snap, if you use the Locom receiver with block downconverter, and a high-quality, 12-foot Cimco aluminum mesh antenna.





lites, is now planning a 'newsbank' service to affiliates between 2 and 3PM (ET) daily using W4, transponder 19 leased from Robert Wold. Program consists of approximately 25 separate news and feature stories per day and is intended for local stations to tape and then excerpt from for local news programming.

S/A ended current fiscal year on bright note; increased earnings in last quarter. Sales for full year dropped, but sales in most recent quarter were up markedly.

ATLANTIC RICHFIELD has completed operational design phase for highly sophisticated internal corporate video conferencing network using SATCOM F5 bird. Network includes video conference centers in Anchorage, Philadelphia, Los Angeles and Dallas presently and will add additional centers. Harris supplied most of hardware including customized scrambling system.

GALAXY 2 bird, 74 west, now undergoing flight check out and testing. Bird has 24 transponders, all 9 watts but **no video** is planned. Half of full bird has been pre-sold to data/telephone communications firm which plans national network of non-Bell related communications.

US DEPARTMENT of State, acting on behalf of MPAA, has been visiting countries in the Caribbean recently to urge that where local cable firms are 'stealing' US domestic satellite signals for re-use, that such activities be stopped. Recent visit to Santo Domingo cable systems in Dominican Republic brought issue to head there; firms are carrying HBO and other signals without formal approval. State Department has told DR government that unless activity ceases, the country will not be able to participate in forthcoming Caribbean Act benefits.

GSTAR, 12 GHz bird(s) from GTE Satellite Corporation, requesting FCC permission to modify number two and three birds to allow 50 dBw ground level signals for DBS operation. Planned are two spot beams, one for northeastern USA and second for west coast of USA.

SPACE holds 1983 version of annual convention and international trade show this month over period November 3-5 at the Disney complex in Orlando, Florida. Gathering includes dealer oriented seminars November 3rd, SMATV seminars November 4th and special international seminars November 5th. Contact SPACE at 202/887-0605.

COOP/ continued from page 5

The defense in this case was handled by a single attorney; Miami attorney **Steve Gomberg.** He had an interesting approach to defending the bar guys. He told the court that there was no violation of the copyright law because of a loophole in the 1975 law. That loophole allows bars and taverns and other commercial establishments to carry for public display any broadcast or public programming which is **"received on equipment commonly in use in private homes."** To make his case, he cited SPACE provided numbers that claimed there were 400,000 private, home, TVROs in the USA right now. He hoped that 400,000 was a big enough number to convince Judge Kehoe that terminals were "commonplace."

Well, the NFL attorney, **John Vanderstar,** saw this one coming and he had his **own expert witness** to testify. It was a chap named **Harley W. Radin** who is Vice President of Regulatory Affairs for a Bethesda, Maryland firm calling itself **Satellite Systems Engineering.**

Old Harley did a number on us. He used photographs and other exhibits to convince the court that satellite dish systems were (1) expensive, (2) technically sophisticated, and (3) not commonly used in the home.

In a sense, this was not **our** industry's fight; it was a battle being waged by three bars in South Florida. **Unfortunately,** this was a federal District Court and the instant ruling by Judge Kehoe can and will be cited and re-cited and used and re-used by other judges and other courts nationwide.

The plain truth is that the NFL was **prepared,** with Harley's help, to show the court how terribly complicated and cumbersome and sophisticated TVROs were. And the plainer truth is that as an industry we were totally unprepared to convince the court to the contrary.

Bob Behar was on the spot; as President of SPACE, and as a manufacturer of **really big** and sophisticated systems such as Harley was describing. Bob was NOT the industry representative to have on the stand when we were trying to convince the court that 8 and 9 foot

dishes are cheap, commonplace and unsophisticated. Bob doesn't sell any of the above and the courtroom found that out in short order.

Bob told me on the telephone that the NFL attorney had a stack of **CSD** and **ORBIT** magazines in front of him. And that the **CSD** article appearing in the August issue, concerning piracy, was brought up in the trial. Bob felt that by publishing material such as the piracy agrument story, we were in effect handing ammunition to the other side.

He could be right, but I doubt it. I believe it is far more important to clean up our house from within than it is to ignore problems that won't go away **unless** they are addressed directly. But I can certainly appreciate how uncomfortable he was made to feel on the stand when he had **CSD** and **ORBIT** waved in front of him. **They** didn't do-in the case, however. The testimony of Harley Radin did.

This was an important case since it created a bit of case-law for future courts to look at. Even if the Judge side-stepped the charges relating to Section 605 **initially** (he did, and ruled only on the Copyright violation issue), they have at least come out into the open.

It may well be that the bars in question had no business tuning in the clean feeds in a public form. Certainly the bar that the NFL charged was itself charging $5 a head for people to come in and view the game was out of line! Come on now . . . **first** you tap into a private feed to gather a crowd in your bar so you have a bonanza day selling suds, and THEN you turn around and hit everyone in the bar for $5 to watch the game? **Maybe the NFL didn't need the testimony of Harley Radin afterall.** The bar guys were in so deep at this point that nobody could have bailed them out.

You, as a dealer, in TVROs, should pay some attention to this situation. It is very-very tempting to tell that tavern you have almost ready to buy a terminal that he can (1) tune in blacked out sporting events (fights, football, etc.), and, (2) maybe . . . just maybe . . . he can get the cost of his TVRO back by **charging** for the events. If **you** feel tempted to do such a thing, consider that if the NFL had really wanted to do so, they could have enlarged the scope of their case to have included the guys who sold and installed the terminals in question, and maybe even the guys who built the gear. They didn't have to, nor did they apparently feel it was necessary to muddy up the waters in this particular case. But the next one . . . well, **YOU** could be a defendant.

Use your common sense. **Stay out of bars.** And taverns. Have the buyer sign a sheet of paper wherein he agrees that he understands that there are certain programs available on satellite which he may **not legally be entitled to tune in** and display. Make him understand that you cannot and will not be held responsible for what he does with his terminal after you have installed it. And for heaven's sake, don't set up a demo for a tavern or a bar and then let them tune-in something that is not for their viewing. If **they** get caught doing this while **your** terminal is on demo-loan to them, well, it's all over.

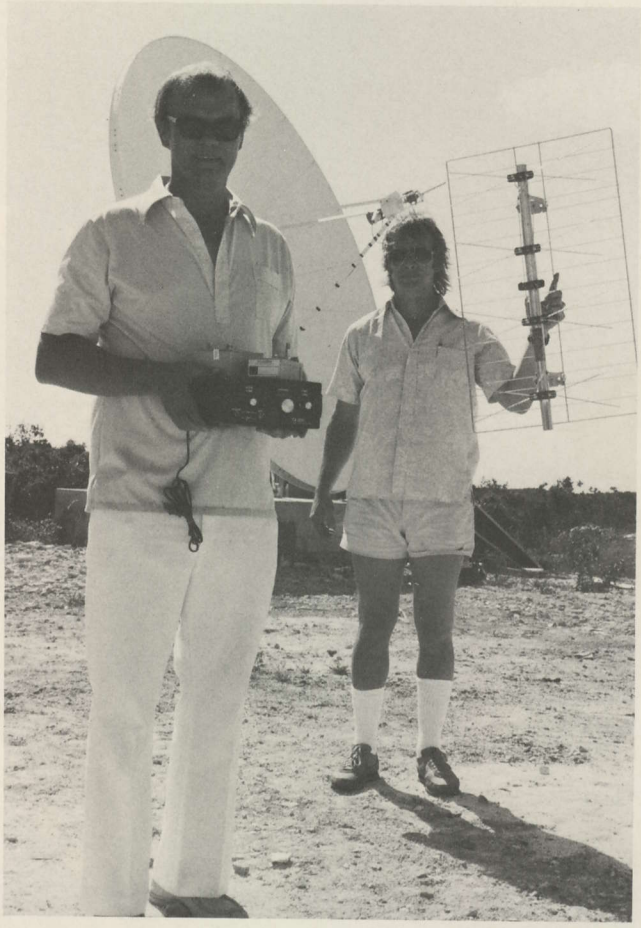
VISITORS WHO SHARE

Among the visitors I logged in at Provo during the past month were **David Lantz** and **Roger Linde** of **TX Engineering** in Renton, Washington. The duo (plus Margie Linde) made the cross-country trek to Fort Lauderdale, and then returned with me to Provo as I was coming back from the European CAST '83 show.

Those who will be attending the SPACE Orlando meeting in early November will see (or did see) engineer Lantz holding forth in a seminar session discussing something called Custom Television Networks; a euphemism for SMATV with a twist. The TX concept will be the subject of a detailed hardware and theory look in our forthcoming **December** issue of **CSD;** and those who subscribe to **CJR** have already read about their approach to marketing trailer parks and condo groups with 12 or 24 channels of satellite TV (see **CJR** for **October**).

Most of their visit was spent doing something which I have reason to believe has not been done by very many people before us. I know it is not totally new, since a fellow named Russ Walsh has been doing this up in British Colombia for a year or more. The concept is this.

You take a standard TVRO dish and you stick a good quality LNA and a good quality down converter on it. Out of the down converter comes say 12 channels in the +6 to +16 dBmV region. That's enough signal to provide first class video on a TVRO demodulator. The down converter in this instance is a block conversion device and it has an output of 450-950 MHz. Now we have the signals, all 12 of them in the case of F3R and **one** polarization, leaving the down converter and heading for the TVRO indoor receiver/demodulator.



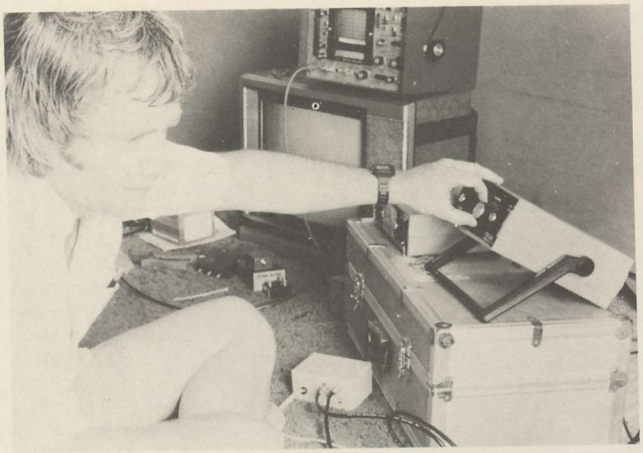
LINDE AND LANTZ. Roger Linde (left) holds the TX Engineering reception package (receiver, down converter, 450-950 MHz line amplifier) **and Dave Lantz holds a representative home-style reception antenna. The name of the game is** 'db's per dollar'; **how to serve the greatest number of viewing locations with the most signals, for the fewest dollars invested.**

Here is where we detour the signal. Rather than running it through a chunk of RG-59 or RG-6 to an indoor receiver, we run it into an amplifier or two. We build the block of signals from the nominal +6/16 dBmV level to say +40 dBmV. That is a level which is comparable with a cable system line amplifier unit. If you connected that +40 dBmV signal to a new chunk of standard good quality RG-59, you could carry the 12 channels over a distance of perhaps 700 feet maximum before you ran outof signal and could no longer properly drive a TVRO demodulator/indoor receiver. But it is **one way** to get a TVRO dish antenna a considerable distance from the receiver location.

Since we have this 'powerful' +40 dBmV region signal available to us, we wondered what might happen if we hooked it to an antenna; say a special antenna designed to cover the region from 450 to 950 MHz. This approximates the UHF TV region (470 to 890 MHz). And then we let that antenna 'radiate' as in re-broadcast the signal from our amplifier.

The skeptics in the crowd are suggesting that we might get 1,000 feet or so away and with another antenna, perhaps pick up the signal that 'radiated' from our transmitting end, **and still watch pictures** on the receive end.

Well, as I sit in the WIV studio writing these words I am keeping an eye on a receiver that is watching those pictures which originate up at the WIV tower. The distance is 2.5 miles, or more than 13,000 feet. The pictures are virtually the same as I see at the WIV tower site from the same dish. Here, 13,000 plus feet from the 'transmitter' that is



LANTZ at work on his system. We evaluated both the TX Engineering receiver and the Anderson Scientific receiver package using the through-the-air system. Details on how it all worked out in the December CSD.

shooting out all 12 of the vertical polarization signals from F3R I can tune in any I wish. I am using a $10 antenna and some quite inexpensive home style UHF TV signal pre-amplifiers at my receiving site. If I wanted to, I could install two or 2,000 (or virtually any number) of other identical receive installations between here and the transmit site and we would all share the same 12 channels of service watching which ever channel we wished.

This is not legal in the United States. This is also not legal in Canada. But in India or Costa Rica or St. Kitts or virtually anyplace else in the world, it is just fine to engage in this type of 'shared' reception.

This is cheap; very cheap. If you took 100 homes, you could serve each with 12 separate channels of satellite television for a fraction of each having their own dish.

This is secure; very secure. The signal travels through the air as wideband FM, just as it comes off the satellite. A standard (AM video) television receiver will tune across the spectrum and not even know the signal is present! FM, a modulation technique, is virtually invisible to an AM receiver. So that means that only those people who have been 'authorized' to receive the signal(s) will do so. It takes the special (FM) TVRO demodulator to make the signals play in the home. If you control distribution of the receivers, you control who gets the signals.

This is power and spectrum efficient; very efficient. We are covering 2.5 miles with a transmitter that is operating in the 1/1000th of a watt and down class. FM makes it work. It could never be done with AM.

Lantz, Linde and I brainstormed the night before they returned to the states making a detailed system analysis of where the system was good (and ready to go), and where it needed some more hardware. We developed a shopping list that included specialized receiving antennas flat from 450 to 950 MHz ready for direct 75 ohm cable connection, some low cost signal pre-amplifiers for 'fringe' installations, and a nice transmit-antenna-tower mounted power amplifier for the 450-950 MHz region. Then we set out to find some suppliers for this specialized equipment.

You could do what I did (with the help of Lantz and Linde) right now, today, with off the shelf parts; stuff you can find at most decent electronic distributors. But you could do it even better and cheaper if you could specify specialized equipment designed from the ground up for this exciting new service.

We'll talk about all of this, in detail, in our **December** issue of **CSD.**

ENGINEERING Visitors

Immediately following the week long visit of the duo from TX Engineering, who left Provo with an operating through-the-air 12 channel satellite distribution system (**SDS** for short), **Jim Halley** who is Vice President (of) Engineering for **Intersat Corporation** showed

When Reliability is Important . . .

SKYWALKER

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Antenna Drive and Control Systems

For Further Information Contact:
Superwinch, Inc., Putnam, CT 06260, USA or call (203) 928-7787. Telex 643981 SWINCH PUTM

Please send me more information on your Skywalker™ antenna drive and control systems.

Name: _____

Street: _____

City: _____ State: _____ Zip Code: _____

Dept. 10

up. With him came six brand new, very unusual, single channel down converters, some commercial quality prototype Intersat single channel demods and six modulators for a cable system. We were going to use a pair of the Challenger 11 foot antennas, a trio of name-brand 100 degree LNAs and play around with four F3R signals and a pair from W5 working out the bugs and field testing some SMATV techniques that Jim has been pursuing.

So I shifted gears from sending 12 channels through the air to sending six (initially; six more will be added in a few months) through some 412 cable to a group of condominiums on Provo's north beach. It was not a difficult mental change for me since I grew up in the cable TV industry (starting in 1951 no less) and really enjoy cable work.

After he got over the culture shock of finding himself on an island in the Caribbean and bunking less than 75 feet from the ocean's pounding surf, we settled down to the business at hand. Actually he only had two days to get his act together before we were joined by another VP of Engineering; **Bob McCollum** of **Microwave Systems Engineering** in Scottsdale, Arizona (*). A few words about McCollum and why he joined us.

Careful readers will recall that in our editorial review of the Intersat IQ-160 system this past October (last month) I took Intersat to task for allowing themselves to be sucked into using 30 dB gain LNAs bolted directly to their IQ-160 down converter at the feed of the dish. I even suggested that if I was running things for Intersat, I'd get back to at least the 44 dB range of LNAs so my dealers would not be able to create problems for themselves in installing systems. McCollum had been airmailed an advanced copy of my IQ-160 review by Intersat's McClaskey and he decided to join Halley so he could defend his position on using low noise amplifiers with less than 44 dB of gain. Nobody told me this in advance; I was told that McCollum was coming down to Provo to test some new LNAs that Intersat was interested in

INTERSAT's Jim Halley doing the 'A' / 'B' comparisons on Provo.

*** — Bob McCollum, VP of Engineering, Microwave Systems Engineering, 7735 East Redfield Road, Suite 100, Scottsdale, Az. 85260; (602/948-7082).**

using. I found out there was more to his coming than that.

Before McCollum arrived, Jim Halley and I had plenty of time to talk about equipment design philosophies. Jim is one of the top ten, no, make that top-five, design engineers in our field today. He usually takes a backseat position at Intersat allowing McClaskey and Davis to do the showboat stuff but even before I met him I had considerable admiration for his work. As I revealed last month, the Halley designed Intersat down converter was **one of** the top performers in our May testing of down converters with the ROBS group, and even prior to that I had been more than suitably impressed with the way the Intersat packages worked down here where the signals are so variable in level and quality.

Unlike some of the bright engineers in our field, Halley is quick to recognize and acknowledge the ideas and creativity of others. I like that; I figure any engineer who either carries a chip on his shoulder, or who suffers from a complex because he didn't think of something first, is not long for this world. Halley has neither problem.

"Let's talk about down converters," he said to me the night before McCollum showed up. I agreed.

"You know, I think you were on the right track with the noise figure tests on the down converters last May," he started, "but maybe you didn't take it far enough. Maybe you didn't realize what you should have been looking for; where the **real** key to good down converter performance is." I responded that I had a sixth sense that we WERE missing **something important** in system performance when we compared systems against one another, and agreed that I couldn't yet put my finger on it.

We talked about down converter noise figure and I had Jim explain to me why a massive push to create a down converter with say a 7 or 8 dB noise figure was **not** important. Patiently he took me through the numbers and showed me that if you really had sufficient gain out in front of the down converter, with a quality low noise figure, there was a point of diminishing returns with trying to shove the down converter noise down further. "So noise figure is **not** the answer?" I asked.

"Well, it is not the **total** answer. You cannot ignore it, for sure, but you can't really get an advantage if you **only** pay attention to the noise figure. I think Bob McCollum will show you that if you take a few other things into consideration when you layout the down converter, you can then take some important trade-off steps in the LNA specs." That was my first signal that McCollum was coming to see us with a purpose.

McCollum's LNA manufacturing facility is little known in the industry. That's because virtually all of their production goes to Intersat, at the present time. Microwave Systems Engineering **only builds** LNAs with 30 dB of gain. They don't build 44s or 50s or 55s. Just 30s.

"Not everyone can use our LNAs," offered the man from Arizona. At that point we were just getting into our first real conversation and I resisted responding that I hoped not since I felt the 30 dB gain plateau was a terrible mistake. "The down converter design is the reason why," he continued. "Have you looked closely at many of the down converters?" he asked. I have taken the tops off of most of them and looked, yes. But since I do not make a living designing down converters I can only reflect on the general design. I don't see very many of the subtle things that Halley picks up instantly. Worse yet, I don't have the detailed day in and day out experience to profit from what I see.

"Most down converters are atrocious," he continues. "They have been laid out by people who have no real background in microwave design. And if a poor layout/design is not a bad enough problem, then they compound it by placing the circuit on a piece of G-10 or some other totally unsuitable board material." Instantly I was afraid that McCollum was one of those **purist engineers** who thinks most of the products in our industry have been designed by former CB radio operators who woke up with a wet dream and a vision of a satellite receiver one bright morning. I was wrong. McCollum is a purist, but he is no teckno-nut. He doesn't even like the IEEE.

The next day Jim and Bob hauled a pile of MSE 30 dB gain pre-amplifiers up to our Tower Plaza facility. That's where we originally tested the Challenger 11 antenna and where we have several antennas and feeds and LNAs and receivers in operation. I left them there for about half a day, alone, and they proceeded to swap around

MSE's Bob McCollum on Provo.

LNAs and down converters and receivers. Late that afternoon I joined them and discovered that Tom Humphries had spent the afternoon with them as well. For those who are new to the industry, Humphries is a former President of SPACE who now lives on Provo. He is a qualified LNA and receiver man from design to installation. And he is far more stubborn than I am about changing a pre-conceived notion. I knew something significant was about to be demonstrated to me when Humphries winked at me as Halley refreshed my memory of how the 12 foot Paraclipse system with a brand name 85 degree rated LNA and AVCOM 2 receiver worked. He was starting out his demonstration by showing me my own system, as it was **before** they got there.

Then we pulled off the AVCOM down converter and the receiver and substituted an Intersat down converter and receiver.

Now some people wonder how we can make meaningful tests down here without taking the time to do a CNR and video SNR hard measurement on several transponders spread across several birds each time we change the equipment. I suggest they ask Jim Halley or any of a number of other qualified engineers **who have been here** why you **can do** eyeball testing, quickly and accurately here, when you can't do the same thing in Missouri or California. The answer is really quite simple.

We started off, years ago, doing hard measurements on everything we changed. Then we began to notice as we did this that we could 'see' changes far faster than we could measure them and if we were going to an 'A' / 'B' test rather than a hard dB number, you didn't **need to do** measurement testing.

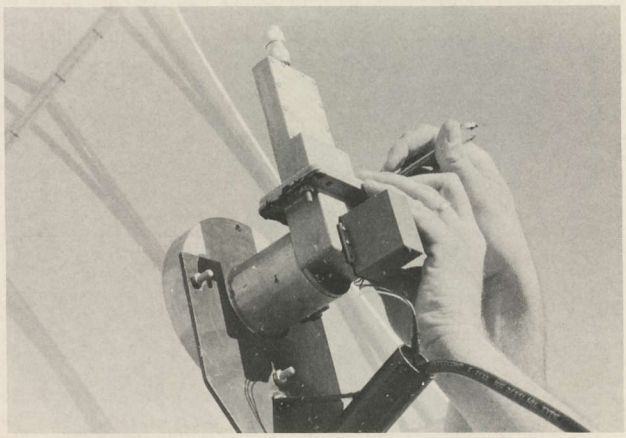
That is possible because on a 12 foot quality dish here the very best of the F3R signals is 2 dB above nominal receiver threshold. And, this is the important part, the very worst of the F3R signals is 4 dB below threshold. They stair step, almost perfectly, from +2 to 0 to −2 to −4; reference threshold. **Each** of the four antenna sets on F3R **has its own level here,** and that level varies by 2 dB from the nearest (in level) other antenna set. A perfect off-air comparison situation since you have **six transponders in each** of the four antenna sets, spread through the band from 1 to 24 and spread in levels over a 6 dB range.

Jim Halley. "I knew you had some weak signals here but I didn't realize how the F3R levels differ. I **thought** we could simulate the same thing in St. Louis by simply using a four foot dish. **We can't** because we can't build in that 'stair step'."

So when you swap out an LNA or receiver or feed, it only takes a couple of minutes to 'see' that you are better or worse since you have 24 check points to work with and after a small amount of experience everyone of those check points tells you something.

Back to the swap out of the AVCOM for an Intersat. **Equal performance overall** with the Intersat slightly ahead on a couple of transponders. Just to verify that we hung a splitter on the 4 GHz feed, fed both down converters and both receivers simultaneously, and switched base band video back and forth on the JVC monitor by going from 'A' to 'B' inputs on the JVC rapidly.

Having established that, the next step was to take one of Bob McCollum's 30 dB gain LNAs and substitute it for the 50 dB gain unit



MSE's 30 dB gain LNA is about half the size of a typical LNA. One of their size-reduction tricks? No isolator.

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on the 12 foot dish. We bolted the Intersat down converter directly to the small LNA and started over. Hummm. We had better pictures, once again.

"How confident are you about that (85 degree) LNA we took off the dish?" asked McCollum. We said we had never had it measured, but it was by comparison testing the best of that particular brand we had ever seen. He offered to take it back to his plant in Arizona for noise figure verification and we took him up on that.

After a half day of comparison swapping, Humphries and I came to independent but parallel conclusions about the feasibility of using a 30 dB gain LNA bolted directly to a down converter. We **now understood** what Halley and McCollum meant about down converter design variations. We could **see** the difference with our own eyes; if you used a down converter that paid very close attention to things like 'image noise' you could 'get by' with a 30 dB gain LNA. One of the units we tested had a measured noise temperature of 65 degrees. When we used it with a down converter that had not been properly designed, it looked no better than an LNA with a 100 degree noise figure. But, when we used it with a properly designed down converter, we saw a considerable improvement in picture quality.

Humphries is a much tougher 'sell' than I am since he spent several years with pioneer LNA manufacturer **SCI** (now Gardiner) back when this industry started. He had far more LNA experience to draw upon than I and he was more than skeptical that you were going to make the system play as well as (not to speak of better-than) unless you had gain in the 44 dB up region. **"The numbers simply do not compute,"** he kept saying.

Microwave Systems Engineering has something. Since we had several LNAs, several down converters and several receivers to mix and match, I didn't have any problem seeing what a dramatic impact down converter design does have on system performance. And no, down converter 'noise figure' is not **all** of the problem. Nor is 'image noise' **all** of the problem.

I am not sure how many of the receiver manufacturers have a down converter presently that can use the MSE 30 dB gain units. I know Intersat has one and after learning more about what it takes to gain a dB or so system performance advantage when you design your down converter to properly interface with the MSE LNAs, I'm not so sure that there are many down converters that qualify.

What happened in this instance is the MSE had a new and perhaps novel approach to LNAs. McCollum is a very sharp engineer and he knew before he brought out his 30 dB gain LNAs that they were not going to work in a system unless the receiver manufacturer was willing to invest time and money in perfecting the down converter. Intersat was, and the proof was evident in the tests here.

You cannot take an MSE low noise (they get 60 to 80 degree units quite commonly) unit and slap it on in place of somebody else's LNA, even when you are willing to connect the down converter directly to the LNA at the feed, **and,** get improved results. I say 'somebody else's' down converter' not quite sure if there are any other down converters that have been designed to mate with the MSE unit. Perhaps, **by accident,** there are.

You cannot substitute an MSE LNA at the feed for another LNA and then run 10 feet (or any length) of 213/214 cable to a remote-mounted down converter, **and,** see the system improve in performance. Just a little bit of cable will kill the MSE performance.

You also **cannot** do this with a receiver/demodulator that is shy on IF gain and IF dynamic range. The system still needs some minimum amount of overall gain and if you back that gain out of the LNA, even properly with an appropriate down converter, you had to be able to add it back someplace else. The receiver's 70 MHz section is that 'someplace else.'

One might wonder **why** one would want to sit down and redesign a down converter just to be able to use it with a 30 dB gain LNA. There are two reasons. One is cost. Pricing on receivers has gotten very-very competitive. Pricing on total packages has gotten even more competitive. I can see how a supplier who packages complete systems would find the dollar savings (between a 44/50 dB gain LNA and a 30 dB gain LNA) very appealing. Especially when you consider that **if** the whole system is engineered properly, you can **perhaps** gain as much as a dB in system performance by switching out to the lower gain LNA.

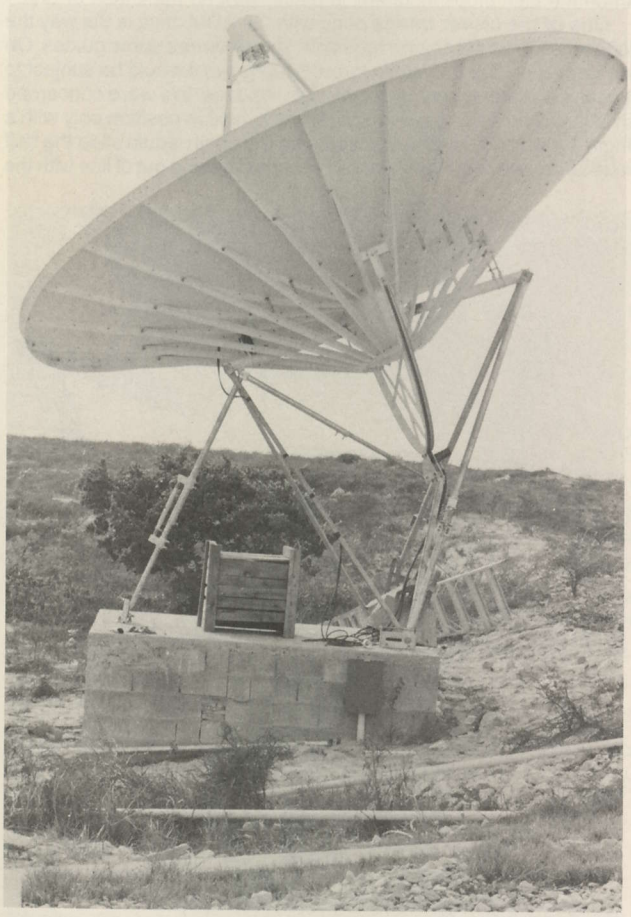
There is no revolutionary **breakthrough here.** MSE will not change the way we do things. At least not overnight. But they are onto something important, something that is leading to improved performance at lower cost. Engineers who are responsible for designing systems would do well to look carefully into what is happening because before it is all done I think we may see some significant changes in the marketplace.

ADM Horizon To Horizon Mount

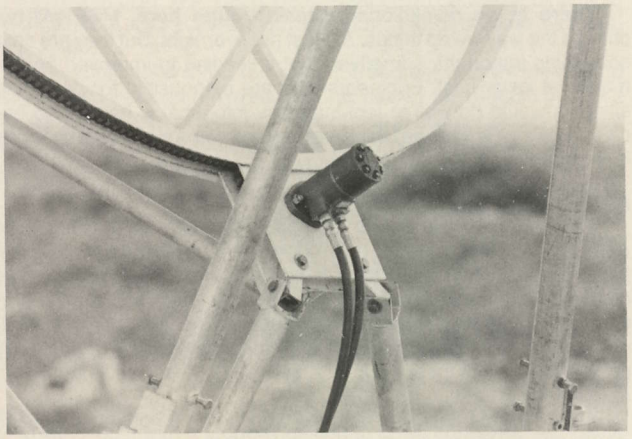
Some months ago (**April 1983** issue of **CSD**) we evaluated the **ADM** 20 foot TVRO antenna and reported that it was the best performing 20 footer we had tested here in the Turks and Caicos. However we lamented the lack of an antenna drive system which allowed the user to take the antenna from one horizon (east) to the other horizon (west) since it was our feeling that this antenna was capable of unusually good performance for both North American domestic and international satellite systems.

ADM's **Jamie Gowen** has been working on a horizon to horizon adaptation for many months and early in September one of the first production systems came down to Provo for test. Along with it came another, new, 20 foot antenna.

The drive system has been designed so that it will go directly on any of the existing 20 foot ADM dishes now in the field. That's good since there are probably many out there wishing to add the full arc coverage to their dishes.

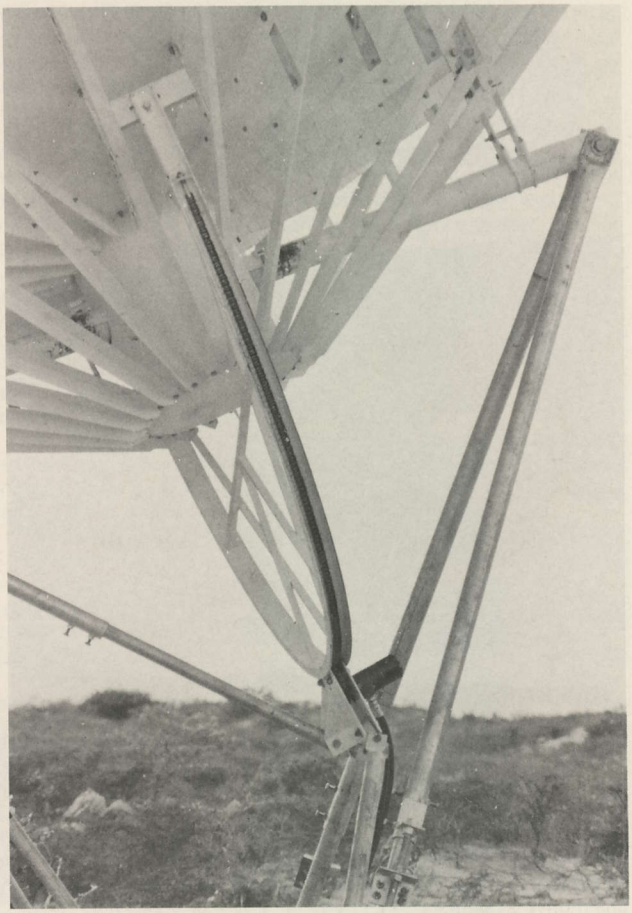


What Gowen has done is to design a half-arc circular guide system which acts as a trough for a very heavy duty chain. The chain is tied down permanently at both ends and it loops through a drive mechanism at the center of the dish structural support system. This is similar in concept to the chain drive in use for the HERO Communications antenna although the ADM system utilizes a considerable larger 'arc' for the half circle and this results in a slightly smoother operation of the chain drive system.



The drive energy is available in two formats; ours is hydraulic although an electrical drive is also available. The hydraulic drive is a bit of a mis-nomer since the chain is driven by hydraulic fluid electrically pumped through a cylinder. So you end up still using electricity. The big plus to the hydraulic system is that it is exceedingly smooth and self-braking, if properly designed. When you let off the motor drive button the dish stops instantly, in place, with no back lash or drift.

One of the clever things done with the ADM drive is the way the trough that holds the chain in position rides **between** some guides. On first inspection, the half-circle through looks like it would be subject to stresses and movement by the dish as it moves. We were concerned while installing it that because each end is held in position only with a single (large) bolt that the pressures on the chain would slide the half circle all around. We had visions of the chain getting out of line with the



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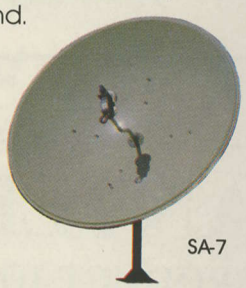

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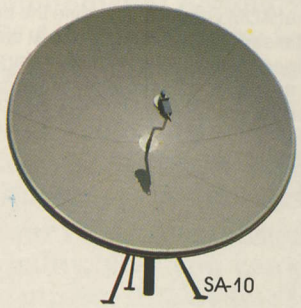

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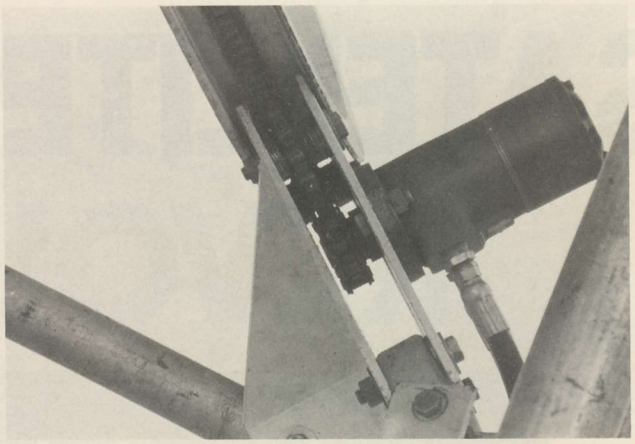
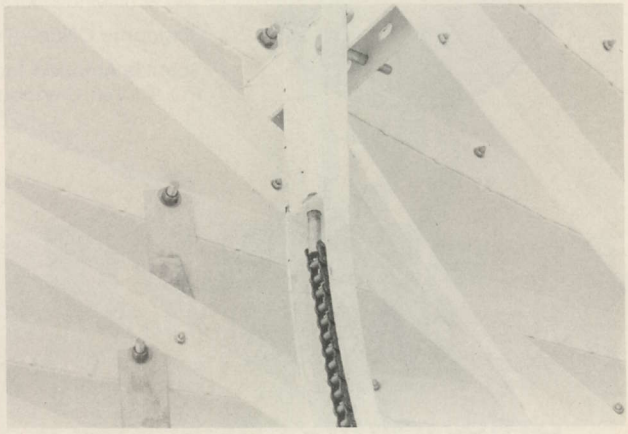


gears in the hydraulic drive motor, and the whole thing falling apart. That was **before we noticed** the way ADM had designed the four-way adjustable support for the chain drive hydraulic pump/motor. There are a set of guides which act as a channel through which the half circle trough moves. As the dish rotates the guides insure that the dish is kept moving in the prescribed pattern. There is no way for the system to 'jump the track' and in a sense it is self aligning. Very clever and like many clever things in life its simplicity is deceiving.

Installation takes but an hour or so with a pair of men and the alignment of the system requires about 30 to 45 minutes.

To round out the Intelsat grade package, there is also an **optional elevation drive jack system** which is also either electrical or hydraulic. This allows you to retrofit the front elevation adjustment hand operated drive with a remotely controlled automatic drive. This particular system gives you about a 30 degree elevation arc to play with, and if you set it so it is in the middle of the arc for the normal geostationary belt, you have 15 degrees south and 15 degrees north to fine tweek for those birds which refuse to stay centered over the equator. With Gorizont drifting plus and minus the equator by 1.4 degrees or so at the moment, that 15 degrees gives you plenty of overkill range; sufficient so that even the French Symphonie bird can be tracked over its **operational** figure 8 pattern.

The addition of the horizon to horizon motor drive (plus the elevation tweeking system) rounds out the packaging on an already excellent dish system. We also noticed that there have been further refinements in the tooling for the dish panels and the circular 'band' that goes around the antenna, and insures that the installer has a highly accurate parabolic surface when he gets done. This antenna went together with greater precision than the other three ADM 20 footers we now have on Provo telling us that ADM continues to refine the product in many subtle ways. Finally, the shroud housing that sits at the focal point to tie together the three feed support struts is now enlarged so that you can 'stuff' inside all of the LNAs, and probably down converters as well, if this is what you want to do.



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STATUS OF STATISTICS

An analysis, **as of the 10th of this month,** of the current pricing and inventory status **trends** in the TVRO industry. Users of this data are warned that **CJR** 'samples' key OEMs and distributors on the 10th of each month to determine trends and averages. Dealers will find this data useful in planning their own purchasing schedules for the coming 30 day period.

CURRENT PRICING/LNAs

For 100 degree LNAs, 50 dB gain, CWO terms, 3 lot purchase.

1) Lowest price reported: **$249.00**
2) Highest price recorded: **$325.00**
3) Average price recorded: **$291.00**

CURRENT SHIPMENT/LNAs

1) Greatest decline reported: **−10** %
2) Greatest increase reported: **+20** %
3) Average 30 day change: **+18** %

CURRENT PRICING/ANTENNAS

1) Percentage reporting price declines **0** %
2) Percentage reporting price advances **60** %
3) Average 30 day change: **+09** %

CURRENT SHIPMENTS/ANTENNAS

1) Greatest decline reported: **−0** %
2) Greatest advance reported: **+37** %
3) Average 30 day change: **+22** %

CURRENT PRICING/RECEIVERS

1) Percentage reporting price declines: **20** %
2) Percentage reporting price advances: **04** %
3) Average 30 day change: **−10** %

CURRENT SHIPMENTS/RECEIVERS

1) Greatest decline reported: **−0** %
2) Greatest advance reported: **+25** %
3) Average 30 day change: **+16** %

EARLY WARNING (Next 30 days)

1) Equipment shortages predicted: **100° LNA, Receivers**
2) Equipment surplus predicted: **None**
3) Biggest downward price move: **Some Receivers**
4) Biggest upward price move: **Antennas**

In surveying individual OEMs and distributors for the 'raw data' that goes into the above monthly summary, **CJR pledges** complete anonymity to its 'sources'. Dealers are asked **NOT** to contact **CJR** for information on 'lowest pricing' or 'greatest declines' referenced here; our pledge to sources is unbreakable! Many issues of **CJR** do, however, contain 'insert flier' sheets from OEMs and distributors announcing (as in advertising) current marketing specials.

NOVEMBER 1983

MID MONTH MEMO

SCRAMBLING? It is frightening. But how **real** is it? The issue has such importance that **CJR** pre-empts much of the regular editorial space this month to cover in some depth the state of the scrambling 'art' today.

SPACE Orlando proved to be a very upbeat show attracting the likes of Ted Turner and Senator Barry Goldwater. Biggest news from the show? **Winegard** is now test marketing 8′ systems at 150 **Montgomery Ward** stores in mid-west, and, the battle between SPACE and STTI is over. The two will 'co-host' the March Las Vegas show using the STTI dates and Riviera location.

SFPC's $750,000,000 consumer financing program and warranty program got off to a spring-board start with more than 1,000 dealers signing up in Orlando.

NEW equipment at Orlando was scarce with most suppliers working on unveiling their latest lines in March. In one show-of-hands at an opening session, more than 75% of those in attendance conveyed that this was their 'first' industry trade show.

Cooper James Report

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NEW PRODUCTS/ SERVICES APPOINTMENTS

ANTENNAS

Kaul-Tronics, Inc. (Box 292, Lone Rock, Wi. 53556/608-583-4833) recently completed **antenna range testing** of their model SS-112 (pressed) stainless steel dish. At Houston's Telsat Corporation, the 112 inch antenna had a measured efficiency of 64% equipped with a Chaparral prime focus feed or 39.5 dB mid-band and 40 dB at 4.2 GHz. In separate tests conducted at Twin City Testing and Engineering Laboratory in Wausau, Wi. the SS-112 was compared in 8 hours of testing against an unpainted spun-aluminum dish and a beige colored fiberglas dish. In those tests the focal point and LNA flange temperatures were appreciably lower than either of the other two test antennas. Full details from Kaul-Tronics. The firm presently manufactures a line of antennas from 7.5 feet to 13 feet in size, using both stainless steel and fiberglas construction techniques.

METALEX Corp. (Box 399, 1530 Artaius Pkway, Libertyville, Il. 60048/800-323-0792) has announced a **'precision expanded metal'** for high performance parabolic satellite dishes. The new metal surface can be formed into virtually any petal shape required using die-cut or high volume laser cut computer controlled, optical tooling, in sizes up to 48″ by 72″.

ODOM Antennas (P.O. Box 517, Beebe, Arkansas 72012/800-643-2950) is currently creating high precision fiberglass dishes from **steel template/molds** accurate to a thousandth of an inch. All of this is the result of computerizing the creative task of designing the first master mold or 'Master Plug' for an antenna design. Individual molds may require as much as sixty days of 'hand work.' Antennas from 8 to 20 feet in diameter are now being produced.

U.P. SATELLITE DISH CO. (2715 Danforth Rd., Escanaba, Mi. 49829/906-789-1027) is now manufacturing a complete line of mesh antennas from 6 feet to 25 feet in size. The aluminum mesh antennas are dubbed the 'Superior' line.

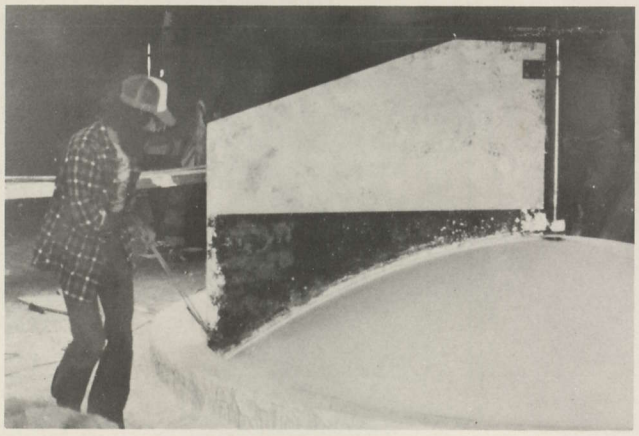
ANTENNA Accessories

NEMAL Electronics International, Inc. (1325 N.E. 119th St., North Miami, Fl. 33161/305-893-3924) has introduced a new line of **'combo-cables'** for the TVRO industry. The new, direct burial cable provides 9 conductors (5 — #22 stranded, 2 — #22 shielded, a drain wire and 2 — #18 stranded) including a 96% shield copper RG-59/U cable. All wires are color coded for prompt identification on both ends. Standard put-ups of 500 and 1000 feet are available. Nemal has been supplying a wide range of cable and connectors to the TVRO industry and others for seven years.

COMPUTRAC (641 W. Broadway, Farmington, NM 87401/505-326-4301) has introduced their model 4000-8000 **'ultimate tracking system'** designed around interfacing with the Atari 400, 800 or 1200 series computers. Using the system the user has complete on-screen display of satellites, position of antenna, warning buzzers to indicate limits. A special introductory offer ($599 shipping paid) includes an Atari 400 computer, electronic interface unit, Computrac 4000 cartridge for the computer, 18″ actuator arm, Burr or Saginaw drive and attachments.

LOW NOISE Amplifiers

Gardiner Communications (3605 Security St., Garland, Tx. 75042/214-348-4747) is offering a **smaller LNA** package (1-7/16″ x 2-1/2″ x 7-9/16″ including the cable connector) in configurations of 50



ODOM — Master Mold Being Prepared.

GARDINER's New Small LNA Package

NEW PRODUCTS/ continued page 15

NOTICE TO READERS

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Original **E**quipment **M**anufacturers (**OEM**s) are encouraged to submit new product releases and news of appointments to CJR's Assistant Editor **Carol Graba** (CJR, P.O. Box 100858, Fort Lauderdale, Fl. 33310) for consideration in our new product section. OEMs, distributors and others interested in reaching the TVRO Dealer Marketplace with product pricing and release news **in the middle of each month** are also encouraged to contact Ms. Graba concerning **advertising** rates and space availability (telephone 305/771-0505 weekdays between 9 AM and 4 PM eastern time).

SCRAMBLING PROFILE: WHO WHAT WHERE

UNDERSTANDING The Problem

The issue before the industry is scrambling. The issue before you, as a TVRO dealer, is how do you handle scrambling when you are engaged in conversations with would-be purchasers of home TVRO systems. Let's look at the state of scrambling technology, first, as a prelude of creating your own 'best-foot-forward' posture, as a dealer, on this sensitive issue.

Scrambling is, by definition, the reconfiguration of a standard television signal into a non-standard form. In a sense, a television receiver designed for use in Europe where the PAL television 'standard' exists would display a 'scrambled' picture in Japan where the NTSC standard exists. In other words, scrambling is not all that sinister; it merely denotes that somebody at the transmission end of the system has adopted a technical method of configuring the television signal which is different from your particular reciever demodulator standard.

There are more than a half dozen widely utilized television 'standards' in use in the world today. The one we are most familiar with, NTSC, came out in the early 50's as the North American (color) television standard. At about the same time there were totally different approaches to creating color television (and sound) being introduced in Europe, parts of South America, and within the Soviet Block nations. The only thing which these 'world' standards share in common is that they all end up painting a picture on the screen of a television receiver; and, they all came along within a time span of a few years.

Approximately 30 years has lapsed since the existing world standards evolved, and behind their release came millions upon millions of television receivers in mass production. In that thirty or so years we have seen dramatic advances in all fields of electronics, and it should not surprise you to realize that better methods of transmitting television pictures have also evolved in that period of time. 'Better,' of course, is a relative term. Better to CBS would mean High Definition Television (HDTV). Better in Europe might mean a picture that does not contain that annoying PAL 'Flicker.' Better in North America might mean improved control over the color content of the signal.

The standards that evolved in the 50's were designed for terrestrial transmission systems; largely 'AM' (amplitude modulated) systems which are relatively 'narrow band' in nature. Then along came satellite transmission where 'FM' (frequency modulation) techniques took hold, and where wide band transmissions were practical. When engineers realized that they were no longer 'constrained' by the limitations of 'AM' and 'narrow bandwidths,' they once again re-thought-out the television transmission process, searching for ways to improve the end result; the quality of the television picture on the viewer's screen. The CBS/Japanese experiments with HDTV is one result of this re-thinking process. The 'state of the art' (or, the technical excellence possible using the best technology available) has certainly changed a great deal since the 50s; especially when the wider bandwidths of satellite transmission is included in the equation.

What does this have to do with scrambling?

You must remember that if any 'standard' is used to transmit a picture other than **the standard** which your particular television receiver is designed to accept, the result is a 'scrambled picture' or scrambled sound, or both. Now, if the people who are doing the transmitting are going to make ANY change in the transmission standard, for the purpose of eliminating you as a viewer, they have two options:

1) Make some change which simply makes your viewing impossible, or,
2) Make some change which results in improved picture technology; which, since any change will render your picture 'scrambled,' actually does two things at once. It eliminates you as an unintended viewer, and, it also creates a better (higher quality) picture for the intended viewers.

This, then, is the crux of the various scrambling arguments. If you are going to make a change (any change) in the transmission 'standard,' do you make that change simply to eliminate unauthorized viewing, or, do you make that change to create a better, higher-quality picture, which also just happens in the process to eliminate the unauthorized viewer? Since there is an 'argument' here you can be sure that different firms approaching the scrambling question are not uniform in their approach to the question.

OAK Orion System

Oak did it first. They were the first to have an operational 'Satellite Security System.' It all began in 1980 and the first 'operating company' to offer the Oak service for hire was a firm called **VideoNet.** VideoNet is a satellite based closed circuit television services firm offering transmission and reception facilities to educators, corporations, sporting event promoters and others.

Oak includes in its customer list VideoNet, BizNet, the U.S. Army, the Canadian CanCom systems (four original channels; 4 additional channels added), the Catholic TeleCommunications Network, and overseas, the 12 GHz Satellite TV PLC service originating in London but seen via the 12 GHz ECS-1 satellite throughout Europe on cable.

Because Oak was a pioneer in this field, they suffered from some rather considerable start-up problems. And inspite of their substantial time-lead, there are today perhaps no more than 2,000 Oak Orion descrambler units carrying Oak serial numbers in the world. It has not been a mass produced product to date.

Oak's attitude concerning scrambling reflects their original intent with the product line. They were only interested in making the video (and audio) unusable. They were not intent (or conscious, or aware) on taking advantage of their 'non-standard' format decision to actually improve the potential quality of the service, after descrambling.

Oak's objectives were:

1) **To provide sufficient security** so as to deny the 'entertainment value' of the pictures to unauthorized viewing locations, and,
2) To implement a system of sufficient simplicity that, in their 1981-82 time frame of final design engineering, they could use then-current 'state-of-the-art' hardware.

Oak maintains that for 'entertainment programming' it is **not necessary** to scramble as 'hard' as it is for more 'sensitive' materials. Hard in this case refers to the visual difference between a scrambled signal and a non-scrambled signal. An Oak scrambled signal has recognizable human or other forms, as anyone who has tuned in the Orion transmissions on D4 or Anik D will recall.

Oak engineering began with the premise that all TV video images are redundant. That is, there are seldom dramatic changes in picture content within a picture you see now, and another one you see 'now.' The waveforms follow a 'standard pattern' and that pattern is established by the particular 'standards' (NTSC, PAL, SECAM, etc.) in use by the transmission system.

If these patterns are modified, on purpose, by re-arranging the sequence of the video information and the 'control' information, the TV receiver will no longer display a discernable picture.

So the Oak Orion system functions by simply re-arranging the 'sequence' of events that appear within a television picture, or which make up the 'instruction signals' transmitted with each picture 'frame.' The decoder is nothing more than a special receiver which has been built to function with an 'Oak-created' standard. Turning it around, it

would display a 'scrambled picture' if a regular NTSC standard signal was fed into it; just as a French television set would display a 'scrambled' picture if it were taken to Japan.

Oak gains no 'picture quality enhancement' with the Orion system. In fact, there are those who would seriously argue that any picture that begins as a NTSC standard signal, is converted to the Orion standard for transmission, is received as an Orion-standard signal and is reconverted back to NTSC in the Orion descrambler, ends up being of lesser quality than it started out.

The Oak Orion service found on Comstar D4, for **ON-TV,** is presently serving around 135,000 individual homes; through SMATV, LPTV and cable TV outlets receiving the service. This service uplinks from Salt Lake City.

The Oak Orion system operating for the Canadian **CanCom** service (4 Canadian and up to 4 US services) on Anik D has a multitude of uplink points. This is by far the most ambitious and therefore the most complex of the Orion networks. Let's see why.

The Orion-standard video (scrambled) is transmitted along with two types of decoding information. The decoding information is transmitted as a form of instruction to tell the Orion descrambler to unscramble the picture. Without that 'instruction' the Orion descrambler would not function. Each of the Orion descramblers has its own unique 'address code' and this allows the CanCom (or other) uplink site to tell each of the authorized decoders, individually and as a group, to descramble the service. Oak (and all of the other non-standard video system designers) is convinced that users will always like the option of telling specific receive sites that they can, or cannot, view certain transmissions. Thus the ability to 'address' individual receive locations has always been a part of the master game plan.

In the case of CanCom, there are individual video **programming uplink sites** in Quebec, Ontario, Alberta and British Columbia. However, there is only ONE central headquarters where all of the instructions (addressing) originates; **Quebec.** There, Oak of Quebec operates a computer addressing system which creates the individual 'address codes' for each of the seven/eight CanCom service channels for each of the receiving locations. Let us suppose that we have a cable headend in Ontario which has contracted for receipt of two of the services from CanCom. The firm wants to be sure that when they supply the descramblers to the cable system, the descramblers are installed just to receive the two channels of service for which the cable firm has contracted.

Each of the uplink sites does their own scrambling. However, only the Quebec site originates the addressing codes. This information is transmitted out of the Quebec site along with the information for TCTV/CHLT entertainment programming. Those authorized sites which receive the CHLT programming get their address codes 'direct.' At the Ontario sites (two) and the Alberta and British Columbia sites, this addressing information is taken off of the TCTV/CHLT signal and extracted at a downlink. Then it is fed through a device called a 'data repeater' which recombines the bulk Quebec-created addressing information with the local entertainment programming. In that way, the Quebec site controls all of the addressing and the addressing codes actually travel to the satellite and back **twice** before they end up at the addressee's location. This may help explain why you on occasion see the pictures on CITV (Edmonton), for example, **un**scrambled whereas the rest are scrambled. This means that someplace between Quebec's computer and the Edmonton site, the addressing data has gotten fouled up and it is not available to the Edmonton site for 'data repeating' with the CITV signal.

Oak presently has a trio of models available.

1) **Orion 'C'** is the generation 'one' family of decoders, currently produced for CATV and video conferencing and video networking purposes in a dual-decoder (redundant system) package. The early models had a single decoder inside of the box but Orion later changed to a model that had two electronically independent decoders in the same container; with the second unit switched on line should the first unit fail.
2) **Orion 'I'** is the stripped down version now being marketed for individual home applications in limited areas. This unit has a built-in modulator (channel 3 or 4) and the unit connects to the TVRO receiver at the (unclamped) video output spigot and fits in between the TVRO receiver and the home TV set.
3) Orion 'L'(SI) is not actually available yet, except in engineering sample quantities; it is scheduled to become available in shipping quantities in the first part of 1984. The **LSI** phrase is one you will be hearing much more of in the future; it stands for **L**arge **S**cale **I**ntegration and it has nothing to do with riding a bus in Biloxi.

LSI is a technique that allows very large, related circuits to be combined into a single integrated circuit. Only this type of 'IC' differs from other ICs because the circuitry is far more complex and far more single-purpose-minded than other IC devices. In the case of Oak, they have spent millions of dollars creating an LSI 'chip' device which essentially eliminates all of the individual parts in their decoder; it is, basically, a complete descrambler on a chip. It is designed to do just what the Oak Orion C or I does, without all of the individual parts.

Tooling up for LSI production is both time consuming and expensive. Those who take this LSI step had better hope that they will be producing and selling hundreds of thousands or even millions of devices using their LSI technology, or they could be in a heap of trouble financially. You don't write off the tooling up costs of LSI by building 5000 of something.

If the video/scrambling for Oak's Orion system cut across no new 'better performance' barriers, the audio is at least instructive to what you can expect from the other systems that came along at a later date. It is scrambled, but in this case it is no longer really adequate to call it 'scrambled.' We have to say it has been 'encrypted.'

Encrypted? That's scrambling done to a fine turn.

A scrambled picture may, like the Orion system, still have some recognizable imagery present. An 'encrypted picture' would have **nothing** recognizable on the screen. In fact, if it is really 'hard encrypted' you might not even know that a picture was being transmitted. We'll see what that is all about shortly.

The Oak audio is 'encrypted.' You can tune across the sub-carrier band with a TVRO receiver and you will not find a sub-carrier with program audio (you may, in the case of CanCom, find sub-carriers with **non-**program audio, such as FM, present however). The audio is simply 'gone.'

Oak, like others that followed Oak to the scrambling well, transmits their audio using a fairly new technology called 'digital audio.' There are, in this world, two basic ways to transmit intelligence. Until a few years ago, there was **only one** practical method and it was called (and is still called) **analog.** Analog audio is what you have with a sub-carrier. Analog video is what you have with WGN or USA Network (etc.). Digital audio is unlike any audio you have ever heard. It is so unlike analog audio that you cannot even tell it is being transmitted with an analog audio demodulator system.

Oak describes their digital audio in the following manner:

'The audio consists of two bytes sampled at a 2H or 31.5 kHz rate. The audio is compressed from 13 bit equivalent dynamic range to 8 bits per sample. Then the 8 bit sample is encrypted and inserted into the video signal.'

Actually, the system has another name; it is called **'sound in sync(s)'** and it is similar to the 'sound in syncs' approach used by the Russians for their northern orbit Molniya bird (see **CSD** for **November** 1983). Only the Russians are not 'encrypting' their audio as Oak does with Orion.

There are tremendous advantages, real-world performance advantages, to digital audio. The signal starts out as an analog signal, it is converted by sampling into a digital signal and then the 'digital data' can be inserted as data-bits into a portion of the video signal where it gets a 'free ride.' If you take this approach, you can eliminate the sound sub-carriers and immediately gain a transmission path advantage because you no longer have the sound sub-carrier sitting out there 'robbing' transmission power from the video carrier. We'll see what that is all about in some detail, shortly.

How well the Oak system performs is perhaps best measured by listening closely to the results of their largest ad-hoc network user; VideoNet. This firm started out on their own, and subsequently became a part of the Oak media empire. They continue to operate as an 'arm' of Oak today.

VideoNet began life by packaging around 95 receive sites for the

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PIONEER MEMBER OF SPACE

Holmes/Cooney fight. By May of this year they had grown up in size with more than 300 sites for the Crown Affair boxing package (where they used 7 different satellites and 9 different transponders to reach all of their receive sites; nationally and internationally). Their bread and butter, however, is video teleconferencing where they typically contract to provide scrambled service to perhaps 25/30 different sites. They are currently providing the Westar 5 scrambled horse racing service from New York to Las Vegas betting rooms (24 Las Vegas sites) as well.

Because Oak encrypts the audio into a digital signal, this gives them a freedom to back into stereo service by activating one or more sub-carriers as well. For example, with a rock concert they might employ a pair of sub-carriers for the respective left and right channels of program audio, and then continue to carry a 'sum' audio signal in the encrypted mode within the video signal. Or, for various professional fights, they might provide natural crowd audio on the encrypted digital audio channel and then provide one or two different commentator audios on sub-carriers.

M/A-COM Linkabit System

The heritage of the M/A-COM Linkabit system dates back into the late 1960's and the prestigious California Jet Propulsion Lab (JPL). There a system was developed to enhance the weak, noisy video images which NASA was beginning to receive from space flights. The limitations of normal NTSC analog video were becoming very evident as unmanned space probes traveled further and further from earth, and their tiny transmitters attempted to send intelligent video signals back to earth.

And whereas the Oak approach to scrambling called for a system that 'denies entertainment value' to unauthorized viewers, the M/A Com Linkabit system approached the problem from a different direction. They explain their approach in this manner:

> **"Your first challenge with a security system is to create a picture which cannot be pirated** (i.e. has no entertainment value). **Once you have gone that far, it does not really cost** that much more **to improve the system so that the image is no longer capable of being recognized."**

Just for the record, it is the Linkabit system which HBO (Home Box Office) has chosen and which you will see being inaugurated between now and the end of the year on west coast transponder 13 on F3R.

It has been said that if you are setting out to scramble the video signal, beyond the mere changing of standards, there are only two 'variables' which you can play with and still be in the analog video transmission mode. And they are:

1) **Varying the amplitude** of the video information,
2) **Varying the timing sequence** of the video information and/or the instruction signals that 'direct' the video information into a picture format.

Given that this is a correct statement, there are then six ways practical to screw up the video. And they are:

1) **Suppress** (i.e. weaken) the sync signals, thereby eliminating the ability of the receiver to 'lock onto' the instructions sent with each picture, causing the picture to 'float' or roll, or both;
2) **Invert** the image (turning light colors into dark colors, dark colors into light colors, creating a 'negative image');
3) **Reverse** the line sequence, in effect painting the picture backwards or parts of it backwards and parts of it frontwards, thereby destroying the continuity of the image on the screen;
4) **Taking the picture apart** by dividing up each of the nominal 400/525 picture information lines into say five 'segments,' and then randomly shuffling the five segments around on the screen so that they no longer make up a coherent picture;
5) **Taking the picture apart line by line** and sending the lines out of sequence so that the received lines make up a picture that is out of 'whack' with the original image, and then using 'storage techniques' storing all of the lines received from each picture 'frame' (image) and re-assembling the lines one frame at a time before allowing the lines to be seen on a picture tube;
6) **Modify or shift the 'time base'** so that the carefully controlled 'internal clock' that directs each picture image into a coherent image paints a non-coherent picture unless the receiver is equipped with a special 'modified time clock' signal.

The M/A COM Linkabit system is based upon approach number four and they call it **'Video Cypher.'** The individual picture lines are chopped up into segments and then the segments are moved around in a random fashion. The key word here is 'random.'

Let's assume that a full picture has 525 lines. This is not actually the case since while NTSC television does have a **capability of 525 lines,** many of those lines are used for other purposes normally, and do not contain video information.

Our 525 lines are now further divided into five segments each. Now rather than having 525 separate pieces of information to be transmitted for a full picture, we have 5 x 525 or 2625 individual segments to the picture. Now we start moving those segments around in a 'random' manner. We take segments A, B, C, D and E from their original 1, 2, 3, 4, and 5 sequence in line 1 and we re-arrange them with say segments out of line 4. Or 44 or 444. The number of combinations we have created, for our badly mangled picture is now 525 x 525 x 5 etc. Obviously it is one thing to chop something up into several billion parts. It is quite something else to put it all back together again, in the exact proper order, and do that 30 complete times each and every second (the television image you see on the screen changes 30 complete times per second).

Random.

Which brings us to another buzz word/phrase in the encryption world; **DES.** That stands for **Data Encryption Standard** and it doesn't mean much unless you say DES Algorithm.

Since we are taking the picture apart, a line segment at a time, and then transmitting the 'diced-up' picture out of its original line-by-line and line segment by line segment sequence, woe be the guy who has to figure out how to put it back together again without a **key.** It is the electronic equivalent of the world's biggest jig-saw puzzle when all of the puzzle parts are about the size of a pin head!

The DES Algorithm is a standard encryption 'key' and the key is essential if you are going to figure out which piece goes where in the re-constituted picture. The concept is that if you always took the lines apart in the exact same sequence frame after frame after frame, a clever person would eventually figure out the sequence you used to take them apart. And he (or she) would then proceed to put the pictures back together again. **But** . . . if you change the sequence, say several times per hour, or minute or even second, well, there are billions of possible numerical combinations out there and therein is the **real security** of the system. It never does the same thing twice for more than a minute or so and even if you do figure it out for one fraction of a second in time, by the time you have it figured out, the sequence has changed again. And again and again and again.

The DES Algorithm is the 'format key' in use and the key itself is sent along with the video information in an encrypted form.

If the Linkabit system leaves little opportunity for the casual or dedicated pirate to tinker his or her way into a picture, the audio becomes an even bigger challenge. Whereas the video remains analog in format the audio is, like the Orion system, digital. However, the Linkabit system offers up to three separate digital audio channels per satellite transmission. They are sent in the horizontal blanking interval portion of the encrypted video and they are 'bit by bit' encrypted once again using the DES Algorithms. There is no trace of audio as you tune through the channel simply because the audio is no longer analog. It is digital and you do not have a digital audio demodulator. And if you did? Remember the DES Algorithms. The audio is bit by bit encrypted and the key changes randomly every few seconds or so. Good luck.

Suppose you set out to find the keys and use them yourself? Back to the DES Algorithms. The keys (one for video, one for audio) are sent on something called the 'control channel,' as digital data, and they are **themselves** DES Algorithm **encoded!**

The Linkabit system makes the boast that it has a 1 to 2 dB 'advantage' over similar untreated (or non-scrambled) analog video. Where does this come from? Actually, it is due to the lack of any audio sub-carriers.

Remember that every satellite transponder has only so much maximum power available. That might be 5 watts per transponder or 8.5 watts per transponder. Remember, also, that the total power

available must be parceled out between the primary signal (the video) and the secondary or support signal(s); the audio. If there is but one audio sub-carrier channel present, that audio sub-carrier removes as much as 1 dB of available power from the video side of the signal. If there are say three separate audio sub-carriers present, the total power loss to the video side can be over 2 dB. And a 2 dB power loss for a 8.5 watt transponder brings the real power **left for the video** down to around 6 watts.

By eliminating any and all audio sub-carriers, the Linkabit system transforms the audio into digital signals carried along 'free' by the video. **No power is lost** to the audio portion, and the full transponder power available is now available to the video portion of the signal.

Remember that the Orion system offers the ability to address individual receive terminals; and that CanCom, for example, uses this ability to authorize individual cable headends to receive one or more of the 7 or 8 CanCom signals being transmitted. The Linkabit system has a similar capability. Individual addresses can be built into the various 'data streams' being transmitted by digital means. In fact, Linkabit claims that 'hundreds of millions' of individual receive sites can be addressed individually. We'll return to that subject before we are finished.

The present packaging and availability of the Linkabit system is all pointed towards the contract to supply HBO. As you read this the first of the descrambler units are being installed for the western time zone (TR13, F3R) clients of HBO. They **expect** to have the system fully operational before 1 January. HBO and Linkabit have also set June 1984 as a target period for the installation of the same packages at HBO client sites served by the eastern time zone transponder (24 or F3R).

HBO has no 'exclusive' lock on the Linkabit system. Linkabit is anxious to expand it to other premium suppliers such as Showtime, and has announced that a lower cost DBS version of the same technology will be available within the first six months of 1984. LSI or "V"LSI (for 'very') techniques are involved to bring the costs down dramatically.

HBO is intent on not repeating the reliability problems which plagued the early Oak/Orion CanCom installations. HBO has a trio of computers generating those DES Algorithms for **each** of the east and west coast feeds. If anything glitches on one computer, a hot standby is instantly ready to take over. The DES Algorithm keys will flow continuously, according to HBO. CATV and MDS clients of HBO will be equipped with a single HBO-supplied Linkabit descrambler unit and they will have the option of purchasing a standby unit for a cost in the $1500 region.

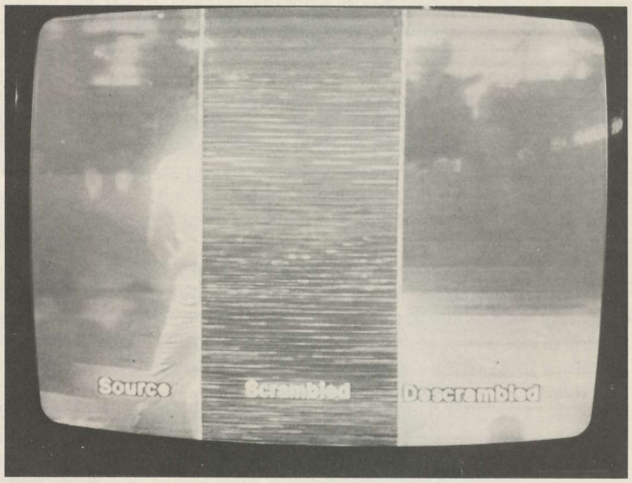
DIGITAL Video Systems (S/A)

This past January **Scientific Atlanta** purchased a relatively small Canadian high technology firm calling itself **Digital Video Systems.** DVS is well known in the broadcast field for its innovative work in the field of time base correctors and other high ticket gadgets which networks and broadcasters utilize to clean up 'dirty' video signals before airing. Inspite of its 'digital' nameplate, however, DVS is not yet into the full commercial production of totally digital video systems. Their approach, like Oak and Linkabit, still retains the analog 'base' for video transmissions.

What DVS is into is taking a whole-new 1983 look at how video signals are transmitted from point 'A' to point 'B.' They recognize that the NTSC system was created thirty years ago, and that given modern approaches to technology and modern component part hardware, that you can engineer around some of the problems inherent in NTSC. DVS is into the 'MAC' system of video (see **CSD** for **September,** page **3**).

From the DVS viewpoint, NTSC as a standard would never have been chosen if there had been satellite transmissions in 1953. They make their point by focusing on some of the shortcomings of the present standard and one of these should be familiar to the TVRO user.

Red. Flaming red, as a color on the screen. Just when you **think** you have all of the 'noise' and 'sparklies' out of a system, someone slips a bright red shirt on the screen and the red breaks up into a dithering field of black and white dashes and dots. The audio may



M/A-COM LINKABIT service (center of screen) **removes all signs of video information from non-authorized viewer's screen.**

even 'buzz.' DVS suggests you blame this on NTSC rather than your satellite terminal, per se.

The standard NTSC signal occupies 4.5 MHz of 'space.' For a terrestrial NTSC system, the video is transmitted as 'AM' or amplitude modulation. But when you transfer the same NTSC signal to an 'FM' (frequency modulated) system, you begin to run into problems. In an AM system, the 'noise' we find in the system is relatively 'flat' as a function of frequency; or bandwidth in this case. In an FM system, the noise tends to 'cascade' or build as the frequency increases. Now, the color portion of the signal is bunched up at 3.58 MHz or about 80% 'up' from the bottom of the channel. In an FM system, the noise in the channel increases with frequency. In fact, the noise of the system is actually proportional to the frequency. The higher the frequency in the baseband system, the greater the noise.

So the noise of the full system tends to slide off to the higher portion of the baseband channel and by the time we get to the 3.58 MHz region of the channel, we have plenty of noise present.

Now enter the human eye. It happens that your eye has the same type of frequency response through the visible light spectrum as FM; your eye also sees better at the 'low end' of the spectrum. When you demodulate the frequency modulated signal to baseband, you return the noise in the spectrum to the low end of the visible spectrum. Your eye has the greatest sensitivity to noise at the low end, and that's where the bright reds are found. Hence when there is a saturated red in the video, it ends up down where both the electronic 'noise' and the human eye's susceptibility to noise are peaked. The red 'breaks up' and it is largely the fault of the NTSC system we have going into and out of the satellite portion of the system.

DVS has an answer for this, starting all over again with 1980ish technology. Throw away the NTSC for as much of the system as possible. At least eliminate it from the satellite portion. And substitute for NTSC a system or standard which is 'satellite optimized'; one which is designed to compliment the 'FM' and wideband characteristics of the satellite video signal. There is more here than simply re-inventing the wheel.

Ideally, DVS would give us totally digital video and totally digital audio. Unfortunately, totally digital video is not yet cost effective; the necessary solid state 'memory' components are just not far enough developed to be available at reasonable cost (a totally digital video receiving terminal would cost upwards of $25,000 per installation today and it is not forecast to drop to the $200/500 region much before 1992). So lacking the component parts necessary to create cost effective totally digital video, the next step backwards gets us to the promise of the MAC system.

MAC? Multiplex Analog Component (system). Its origins appear to be largely British, coming out of a joint British engineering effort created to find a better and more 'transparent' satellite transmission

system. As discussed in **CSD** for September (see page **3**), the British felt that after experiencing three decades of attempting to shuffle television programming around Europe where a half dozen different 'standards' existed, it would be a good idea to find a common 'satellite standard' for the next generation of television. MAC, if finally adopted by the majority of the European broadcasters, offers that promise. It is a kind of 'neutral' standard which can fit in between the terrestrial video source and the terrestrial video receiving station, bridging the gap via satellite. And DVS believes that it has many applications in North America as well. They are hanging all of their cookies in the MAC cookie jar.

With MAC, you compress the video signal in time. It is therefore 'time compression.' Rather than allowing a full line to go all across the screen with redundant information across the full screen, they take the line of video information and compress it together. That gives them roughly a third of the screen 'width' to send other data; information which is separate from the basic video.

Each video line of information has two basic types of information present; there is **luminance information** and there is **chrominance information.** The luminance information is the detail, commonly recognized as the black and white data. A color picture is actually first a black and white picture that has been 'painted in' with color. Since the chroma or color is separate from the black and white, MAC separates the two for transmission purposes. NTSC marries the two together for transmission, and that is of course where NTSC starts to have problems.

MAC time-compresses the luminance or detail information to 40 microseconds and the chrominance or color to 80 microseconds. By separating the luminance and the chrominance, MAC alleviates that 'chatter' problem where both tend to talk back and forth when they are 'married together' on a satellite circuit.

The DVS/MAC system also offers some additional benefits to the system user.

1) **The sync is described as 'more rugged.'** Sync is short for synchronizing signals and they are the third element (after luminance and chrominance) in any standard TV transmission. Remember that the picture in the TV system is composed of millions of separate tiny signals. To make them appear on the picture tube in a coherent picture, you have to continually tell the tiny signals to 'stay in line' and be at a certain place at a certain time. The sync signals (two sets; one is the vertical sync signal and the other is the horizontal sync signal) play the role of traffic cop telling the tiny signals when to appear and disappear, and what order to stay in (one after the other). In a standard NTSC signal, the sync signals take up 20% of the total time in a picture 'line.' In the DVS/MAC approach, they take up only 0.2% of the total time. That's good since that leaves 19.8% additional 'time' or space to expand the detail in other areas. Additionally, because the sync signals are handled in an entirely different way with MAC, the circuits are able to create better sync than with NTSC. DVS speaks of their sync being 'more rugged,' meaning simply that even with a very weak signal, the picture stays rock steady on the screen.

Anyone who has tried to watch a jittering picture will appreciate that if there is a better way to hold the picture stable, it should be pursued. DVS tells us that even when there is a negative ratio between the carrier (desired signal) and the noise, the picture remains stable!

2) **The bandwidth of the signal is reduced.** This opens up an entirely new approach to 'threshold extension,' or the art of turning weak, noisy signals into clear, useful pictures.
3) **System costs can be reduced.** There is an inherent '3 dB advantage' with a MAC standard signal over an NTSC standard signal. **3 dB?** Well, that's like reducing the size or **total area** of a dish by 50%; and still having the same picture quality. For example, where it takes a 10 foot dish to be totally noise free with an NTSC signal, you could reduce the dish size to say 7 feet and still be noise free with a MAC signal.
4) **And scrambling.** It may be redundant to suggest that a person would have to 'scramble' a MAC signal, since by definition a MAC signal would appear scrambled on an NTSC receiver anyhow. But since the MAC advocates expect there to be a big production in MAC-standard-equipped baseband receivers anyhow, they figure that they will have to scramble MAC on top of the MAC standard to maintain the 'integrity' of the services using MAC.

MAC scrambling could be done any number of ways. DVS has approached it by using a time based scrambling system. Remember two things; that MAC plays around with time anyhow by using a time compression technique for creating the MAC 'standard.' Also remember that DVS came into this world building fancy 'time base correctors' for the broadcast market. They, therefore, understand well the art of playing around with the 'timing' or command (sync) instructions of a television signal.

DVS suggests that if you vary the 'blanking period' prior to the receiver clamping action, you can create some very substantial scrambling. As an example, they suggest that you can vary the blanking period to zero, or you could double it. You might do both of these things at different times, and then command the receiver with DES algorithms to follow the changing characteristics of the blanking period.

Not content with varying the timing and shoving the picture 'off to the side,' the DVS system then comes back and adds some 'confusion waveforms' to the video signal. This is a deliberate effort to deceive the would-be pirate. DVS adds extra timing signals to the edges of the picture, and these added waveforms are meant to reduce the odds of a pirate breaking the code more than momentarily using 'correlation techniques.'

What separates the DVS approach from the others is the initial decision **not to use NTSC at all;** but rather to use MAC. Since MAC requires changes in the system timing, it then makes sense to DVS to further mess around with the timing used to establish the MAC 'standard' as a means of scrambling the already non-standard MAC signal. They make the claim that the costs are held low because it requires no more additional circuits to scramble MAC than it does to make up a MAC signal to begin with.

If the video can**not** be digitized at this stage of the game, the audio certainly can be. DVS talks of having a 2 megabit data channel inside of the video waveform and this 2 meg channel contains the audio channel(s), error correction data, addressing data, the encryption key, the descrambling key and even has 'room' left over to individually send separate messages to as many as 4,000,000,000 separate receiving terminal locations!

The DVS encryption will, like Linkabit, use the DES algorithms and follow bit by bit encryption basics. The encryption codes and keys are changed 'every few minutes' thereby thwarting the pirate who stumbles onto the correct key at **some point** in time.

DVS began shipping their first decoder units this month. They will be into the 'thousands per month' region by January, they say, and plan to have a much smaller and far less expensive version available late in 1984; selling in the $100/$200 region. Their market interest is, of course, DBS.

TELEASE/MAAST System

Some credit former advertising marksman **Bob Block** with being the father of the fully addressable, scrambled, tiered concept. Block hopes the US Patent Office sees it that way since he has been attempting to patent the 'concept' of addressable/tiered/pay per view for some time now. His company formed back in 1972 and Block has been around the pay TV horn for quite some time; he was the first President and a founder of SelecTV, seen on Westar 5.

Less is known of the workings of the Block inspired **MAAST** system, than others, primarily because the corporate owner of the system, **Telease,** has recently entered into some type of licensing agreement with the Japanese **NEC** folks and that deal sealed off all normal avenues of information.

NEC has their eye on the 12 GHz DBS market, of course, and that means a quite low cost, secure, addressable, scrambling system. Block talks in terms of 'tiering' up to 200 different program packages per month with as many as 5 'in band' audio channels of information. He also says the MAAST system is capable of controlling as many as 240,000 different subscribers at a time with the speed to change

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Please check one: ☐ Consumer ☐ Dealer

the month 'key' for that many subscribers in 32 seconds time. That's fast.

If we don't know very much about **how** the MAAST system functions, we do know quite a bit about how it **will work** in the marketplace. Block's advertising background, and his natural talents in the PR field, make him more than talkative about 'what' the system will accomplish for the user.

Block believes that the average designer of scrambled, addressable, tirered systems has spent too much time in the laboratory and not enough time learning what the operators need and want. Block falls in line with the operators, naturally, because he has been one. Here is the scenario he sees.

The typical (DBS) viewer will subscribe for a basic service and perhaps pay $20 per month for that service. This could be a single channel of service or multiple channels of service. The programming will be scrambled by MAAST and without a MAAST descrambler there won't be anything to see or hear.

Using vertical interval techniques, the system will carry teletext messages which the user can 'super' over his picture by pushing a button. The teletext messages will be used to list program schedules and promote special block buster events; a special movie tonight, a special sporting event tomorrow night, and so on.

The viewer sees a movie coming up, but because he has subscribed for (and pre-paid perhaps, for) only the basic service, he will have to be willing to pay **extra** for the special movie. The scrambling code will change when the movie comes on and the subscriber has two choices; forget about the movie, or, cough-up say $5 for the movie.

Let's assume the subscriber wants the movie. He may get a five minute preview look at the movie and then his box scrambles the picture and sound and on the screen from the teletext portion of the box the subscriber receives instructions.

"Push Pay Per View Button Now."

Just to be safe, the subscriber has to push it **twice.** That extra push is to avoid people accidentally pushing the button in a moment of confusion.

Now the picture unscrambles and the sound comes in and the viewer watches the movie. Move ahead to the end of the month or the end of the billing period. During the month the subscriber has watched a month of basic service and has chosen some number of premium or pay per view events. The box on top of the TV set has remembered and coded each time the viewer watched a special event. It is, in fact, a microcomputer and a cash register, as well as a descrambler. On the 30th day of the month, without the user pushing any button, the box flashes a message on the screen.

"Time to pay."

The user pushes a button dedicated to totaling how much is owed and the teletext on the screen reveals the total bill.

"$46.00" is what it says and then it gives on screen instructions and tips for prompt payment.

The customer has some period of time (typically five days) to send off a check. On the check the customer prints a special coded number which appeared on the TV screen **along with** the total amount owed. The coded number identifies both the subscriber and it also tells the company operating the service how much money the viewer owes; in 'coded' form. That code is 'down loaded' from the uplink monthly and it changes monthly.

If the customer paid the correct amount (the dollars match the coded amount owed) then the next day after receipt of the payment the computer at the uplink sends new instructions **just to that descrambler/decoder** telling it that it is alright for the viewer to watch another month of television. If the numbers do not match, or if the viewer neglects to send in any money, the uplink shuts the descrambler/decoder off and that is all of the viewing that unit will permit until the bill is brought up current.

Block also envisions customers pre-paying, getting 'credit' which is loaded into their set top box and the box telling them each time they select a pay per view event how many dollars in credit they have remaining.

Thus in the MAAST package there are three important elements:

1) **The uplink signal carries a specific message** for each of the authorized descramblers, and that message directs the descrambler in its operation;
2) **The teletext channel** provides a continually updated program guide as well as a 'hype' channel to promote pay per view (and extra charge) events;
3) **The customer provides the 'feedback loop'** to the system operator with an electronic, automated billing system that requires each descrambler to keep tabs on the amount of viewing done by the subscriber and then to alert the viewer when either his credit has run out, or, when a monthly payment is due.

Block spouts statistics about the marketing advantage to his system. Others have tried 'pay per view' (PPV) techniques. Usually the viewer has to make a choice days or at least hours prior to the event. He may have to stop at his local cable office in advance of the program airing to arrange for delivery of the special event into his living room. Block claims that in a special test conducted in San Diego that when the viewers were given a **button to push,** for PPV, rather than having to drop by the cable office or stand in line on the telephone to order the event, **the rate of subscription went up 343%.** He feels those are significant numbers and they make his instant-PPV selection system a winner.

Losses? He admits that **some** of the people will attempt to steal **some** of the programming **some** of the time. He concedes that "around 1% of the viewers" may get away with watching programming which they somehow avoid paying for. But he also points out that if you use **his system** and increase your revenues by 343%, you really are not going to go broke if 1% of the total viewing 'universe' steals from you.

NEC? They have not said just exactly how they intend to implement the Telease licensed system but Block claims the Japanese firm is shooting for a $500 price tag for the **complete** 12 GHz terminal; **including** his MAAS addressable system. They are aiming at an April of 1984 market availability date and the system is, Block says, going to be of 'LSI' design from the very beginning.

WHO Uses What?

The only formal announcement to date has been that HBO is using the M/A-COM Linkabit system. None of the other premium service suppliers, none of the early entry DBS suppliers, have yet announced which system they will go with.

All utilize a digital audio and analog video approach. Only the Oak Orion system is known to employ a relatively 'soft' scrambling approach to the video. The others employ various techniques of severely destroying the video signal, and then varying the individual destruction 'codes' every few minutes or hours, on command from the uplink site.

Each of the systems apparently enjoys the ability to individually address far more individual receive locations than the pay TV 'universe' is ever apt to contain; at least in North America. At least one of the systems (Telease) marries the collection process with the viewing process, turning the descrambler into an automated 'cash register.'

Each of the systems plans an LSI or VLSI approach to the circuitry before the middle of 1984. That puts each into the same ball game of being capable of manufacturing huge quantities of devices for the mass-growth DBS marketplace.

One of the systems (DVS/S-A) takes an entirely new and perhaps novel approach to the transmission standard and it claims a 3 dB advantage over standard NTSC broadcasts. The M/A-COM Linkabit system makes a similar claim for their system, suggesting a 1 to 2 dB advantage, based upon the elimination of the traditional audio carriers. **This type of enhancement is important for the proposed HBO Galaxy I 4 GHz DBS package** since any technique that makes the six foot dish 'seem bigger' than it is will increase the ability of such a service to survive in the marketplace. And if a 6 foot dish using NTSC standards is truly practical using G1, then a 4.5 foot dish using MAC standards, for example, would be practical.

The growth of the scrambling industry to date has been slow and somewhat painful. Oak's Orion system, perhaps now outdated by the promise of more sophisticated systems at a fraction of the Orion cost, blazed a trail and bought the industry time to concentrate on making

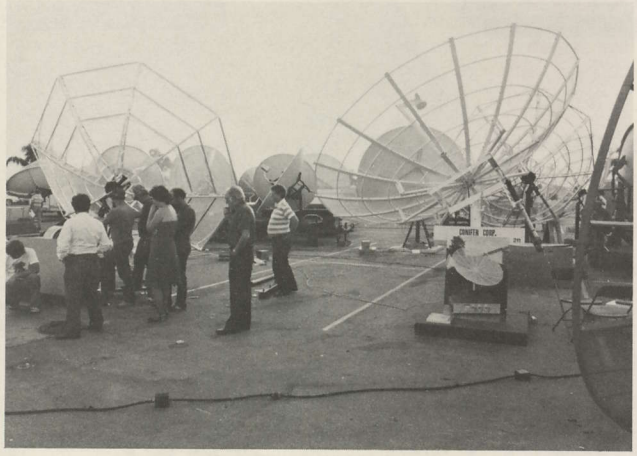
the best out of a bad situation. 1984, by all accounts, will see not only dramatic advances in the technology but considerably increased usage of scrambled transmission formats by a wide variety of satellite video users.

SPACE FALL '83: HIGHLIGHTS IN BRIEF

Playing to an overflow crowd of dealers, distributors and would-be entrepreneurs, the SPACE trade show and convention held at Disney World near Orlando November 3-5 proved to be an irresistible attraction to perhaps 1,500 'real' dealers, and another equal number of industry participants. All 200 plus booth spaces had been sold out weeks in advance, and the parking lot had an 'official' count of 99 operating antennas.

Because of the closeness of the show to the **CJR** deadlines, only a superficial look at the show can be accorded here. A more exhaustive review of the show, and what it brought to the industry, will be found in the December issue of **CSD.** The number-one crowd pleaser at the show was probably a toss-up between U.S. Senator **Barry Goldwater,** WTBS entrepreneur, **Ted Turner,** and, the Satellite Financial Planning Corporation $750,000,000 loan fund. If 'OSCAR' awards had been given for participating in the show, SFPC would have been awarded the 'Most Creative Product' award, Turner would have been recognized as the 'Most Creative Comic' and Senator Goldwater was the hands-down sentimental favorite for 'Best Actor' award.

Turner told the standing-room-only Friday evening banquet crowd that **he** was **'the first'** operator of a **'home TVRO,'** recalling that in 1976 he received FCC permission to mount a transportable 5 meter dish on a trailer and haul that trailer between his South Carolina home and his Newport (RI) racing center so he could follow the Atlanta Braves baseball games. Turner characterized the TVRO crowd as 'my kind of people' with the 'entrepreneurial spirit to conceive of a new industry and see it through to success.' He hoped everyone in the industry 'makes lots of money.'



ANTENNAS GALORE? An official count of 99 operational with a noticeable shift to screen mesh designs.

NEW SPACE PRESIDENT PETER DALTON announcing that the March show squabble had been resolved during SPACE banquet. Immediate applause followed by Dalton's quip "Gosh, and I have only been President for **one** day!".

Senator Goldwater brought down the banquet crowd by espousing his long held belief that **'any signals in my yard belong to me,'** alluding to the on-going arguments that **not all** satellite transmissions are in the public domain. He also told the audience that he started to build a home TVRO system back in 1980, but had not yet finished it because "my wife Peggy is still not convinced we need **another** antenna in our yard." Goldwater is a ham radio operator and already has a yard filled with antennas. The Goldwater speech was preceded by videotaped testimonials to the Senator from nearly a dozen leading Senators plus Vice President George Bush. The crowd watching the whole event could not help but notice the tears in Goldwater's eyes as the testimonials appeared on the screen, recognizing the leadership role the man has played in promoting new telecommunications technology in the U.S. Senate.

The Satellite Financial Planning Corporation presence at Orlando began early and lasted late. Private presentations, by the extensive SFPC staff, began the day prior to the formal opening of the show. Several OEMs, such as Paradigm and Intersat, invited their dealers/distributors to a series of private sessions during which the

SPACE/ continued page 14

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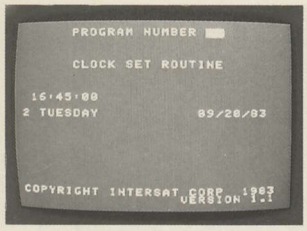
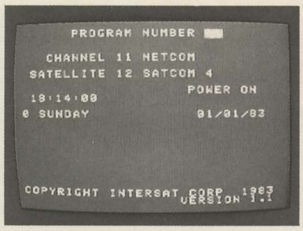
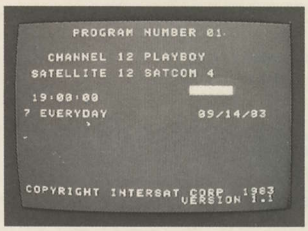


Set Day, Date, Time

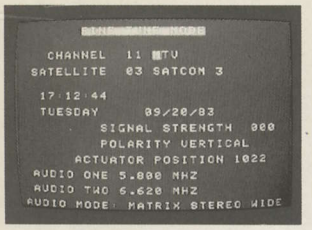


Selects Lockout, Power On, Power Off

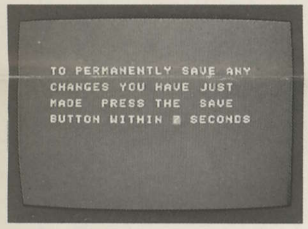


Parental Lockout

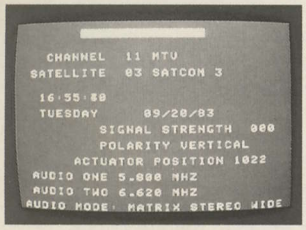
Channel #, Satellite, Day, Date, Time



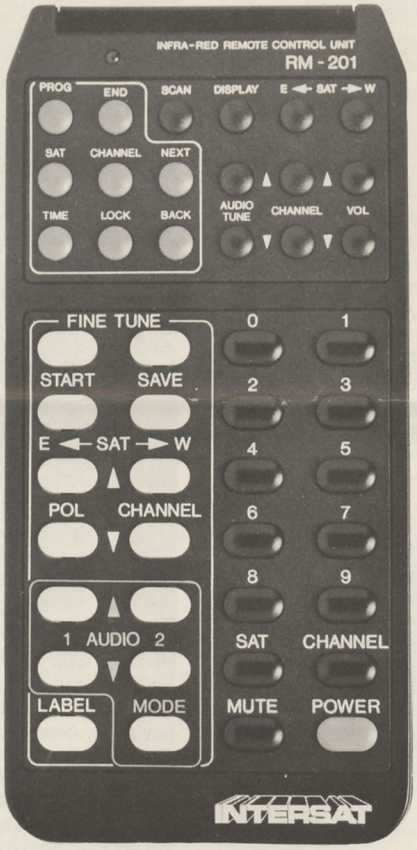
Label Change, Satellite Location, Fine Tunes Audio



Stores All Changes In Program



8 Modes of Audio/Tunable 12 Watts Stereo



Available Satellites for Viewing

Available Channels On Each Satellite

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IQ DISTRIBUTORS

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HUNTINGTON BEACH 92649
714-898-8124 or 963-8694

CANADA
COMMANDER
MISSISSAUGA, ON. L5M 2B5
416-826-8066

NATIONAL ELECTRIC
REGINA, SASK. S4R-1J1
306-569-2882

COLORADO
INTER-STELLAR SYSTEMS
LAFAYETTE, CO. 80026

FLORIDA
E.T.'s
OSPREY, FL. 33559
813-966-6916

GEORGIA
SATELLITE MARKETING
DOUGLASVILLE, GA. 30134
404-949-1300

ILLINOIS
RHODES SAT. CONNECTION
EFFINGHAM, IL. 62401
217-347-0469

INDIANA
KINGS ANTENNA SERVICE
ANGOLA, IN. 46703
219-665-7293

TOTAL SOUNDS INC.
EVANSVILLE, IN. 47711
812-477-6456

IOWA
SAT. HOME ENTERTAINMENT
MARION, IA. 52302
319-393-0965

KANSAS
SATELINK
KIOWA, KS. 67070
316-825-4239

UNIVERSAL SATELLITE
ANDOVER, KS. 67002
316-733-2487

KENTUCKY
RANDOLPH, HALE, & MEREDITH INC.
BOWLING GREEN, KY. 42101
502-781-1460

LOUISIANA
PETERSON ELECTRIC
JONESBORO, LA. 71251
318-259-8891

SAT. TECH
BOGALUSA, LA. 70427
504-735-9915

MISSOURI
ESA
ST. PETERS, MO. 63376
314-278-2772

DOCKERY SATELLITE
WARSAW, MO. 65355
816-438-6192

MONTANA
BURTON SATELLITE
BIG FORK, MT. 59911
406-837-5481

NEBRASKA
SATELINK
NORTH PLATTE, NE. 69103
308-534-4836

NEVADA
CHALLENGER SAT SYSTEMS
LAS VEGAS, NV. 89122
702-452-2263

NEW JERSEY
PATMAR TECH.
BERNARDSVILLE, N.J. 07924
201-766-4408

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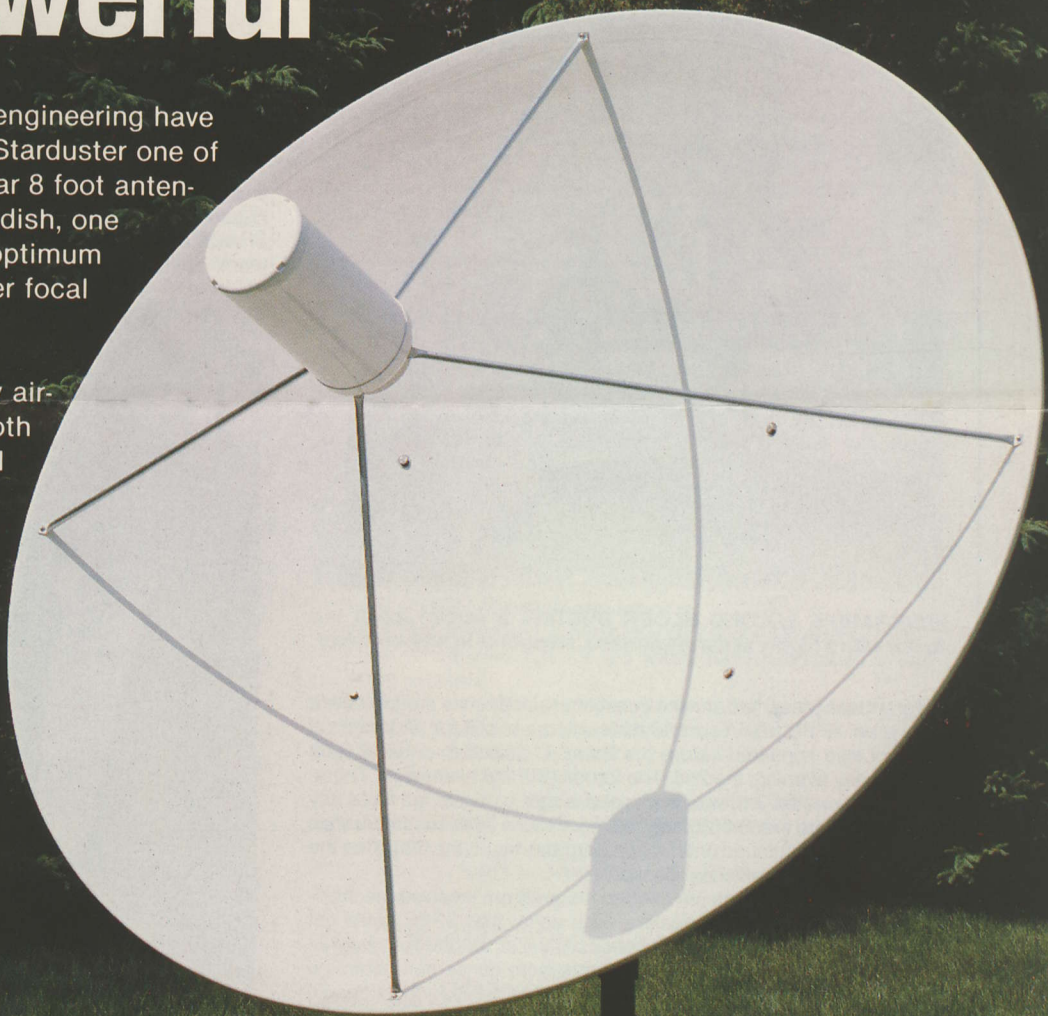

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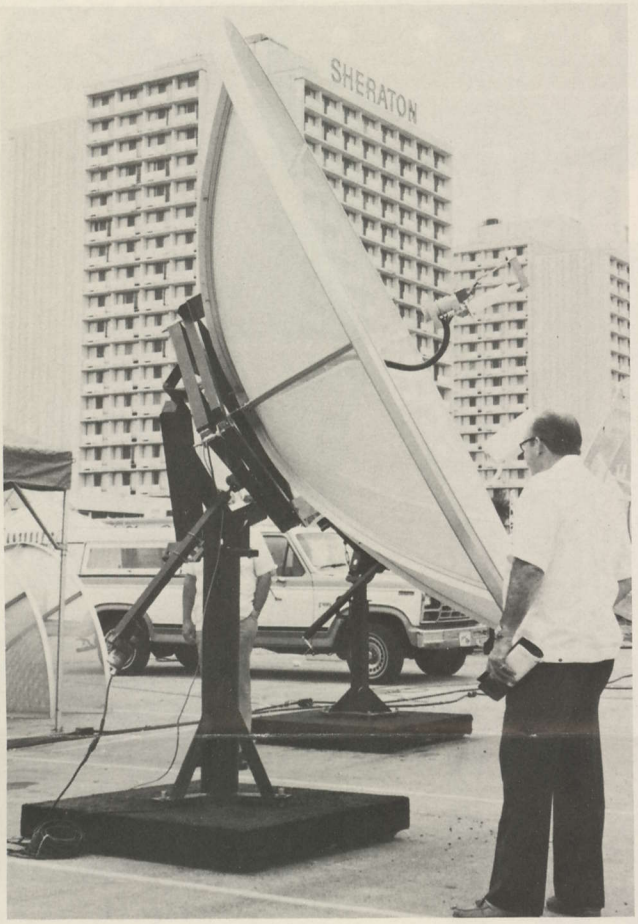
SPACE/ continued from page 11



WINEGARD'S SECOND BLOCK BUSTER/ a screen mesh ten footer with a highly accurate surface, shippable in half-sections.

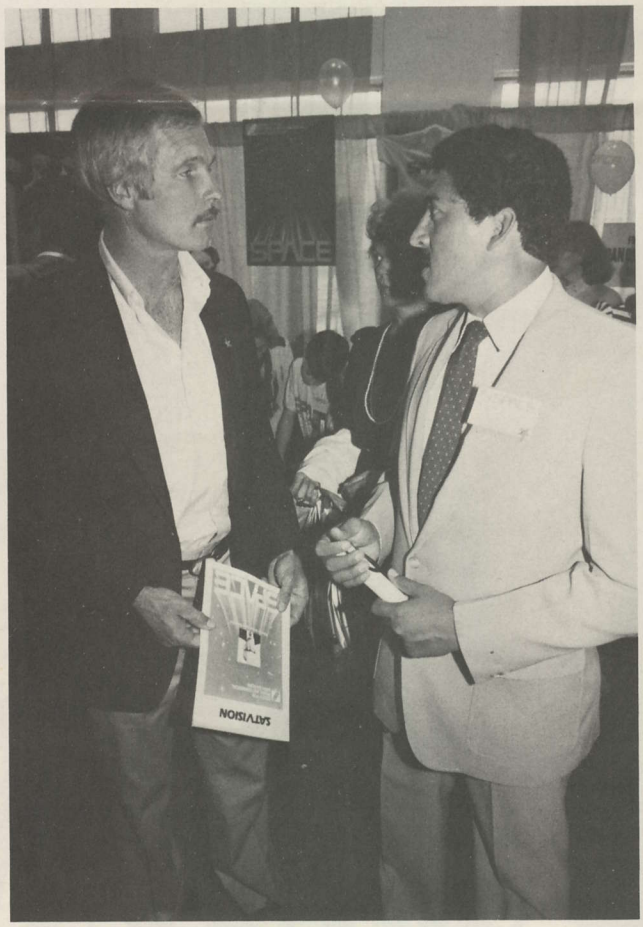
program was presented and the questions raised by the program were answered. SFPC's Bill Young and his entourage of legal and financial backers also appeared before the Board of Directors of SPACE on Wednesday evening, the 2nd. The formal SFPC presentation, Thursday afternoon (the 3rd) was the largest single crowd of the three day event with more than 700 in attendance. Private sessions (more than a dozen in all) continued until late on Saturday night (the 5th), after the Orlando show had officially closed.

Most of the questions concerning the program involved mechanical matters. A number of dealers were upset that SFPC could not supply 'reams' of customer applications at the show (thousands were mailed this past week, however). Others were concerned about the legality of the warranty program in their states. SFPC's legal people showed how the warranty program had been cleared in all 48 of the mainland states, plus Canada. Others were concerned about the $250 one time credit clearance fee paid for by the customer as a part of the package. It was pointed out that the customer could add-on additional purchases after the initial credit approval with no additional credit check fees. At least one OEM will be using the plan in conjunction with a series of nationwide retail outlets where satellite television system packages will be sold, starting this coming December.

At the SPACE Board of Directors meeting a new slate of officers was selected for the trade association. Paradigm's **David Johnson** is the new **Board Chairman** for SPACE; KLM's **Peter Dalton** is the new **President.** Drake's **Ron Wysong** is the new **Secretary** for SPACE while Hero Communication's **Bob Behar** is the new **Treasurer.** A committee including Dalton and Taylor Howard attempted 'one more

WHAT FALLS IN MY YARD IS MINE/ Senator Barry Goldwater with Cooper (behind, center) **and Coax Seal's Tom Harrington** (right); **three 'hams.'**

time' to work out with show entrepreneur Rick Schneringer an accord regarding the 'at-conflict' Las Vegas shows this coming March. Both SPACE and STTI had scheduled industry trade shows in the same month in the same city, approximately one week apart. After several



THEY LOVE YOU IN EL SALVADOR/ Operator Morgan Bojorquez **of San Salvador, El Salvador chats with WTBS's Turner on the exhibit hall floor about the impact of CNN service into Central America.**

TRIBUTE TO THE MAN/ New Space Board Chairman David Johnson (left), **Senator Goldwater and SPACE VP-Counsel Rick Brown** (right) **on stage.**

hours of serious negotating, Dalton and Howard came to a tentative agreement with Schneringer concerning the Las Vegas shows. An emergency meeting of the SPACE board authorized an agreement and when all of the negotiations were finished the conflict between the two show entities was a thing of the past. SPACE and STTI would not only cooperate at Las Vegas and do **one** joint show, but **all** of the remaining shows in 1984 would **also** be handled in a joint effort. An announcement to this effect by Dalton at the SPACE banquet in Orlando brought down the roof with applause.

The Orlando SPACE gathering was proclaimed a 'critical success' by all of those **CJR** talked with. The **exhibitors** were pleased with the traffic, the **attendees** were pleased with what they learned, and nobody had any complaints with the weather. Even the facility, bulging at the seams with the overflow crowd, stood up well. For a more detailed report, see **CSD** for December.

CJR DECEMBER will be mailed December 16th!

NEW PRODUCTS/ continued from page 2

dB gain and various noise figures from 120 down. Gardiner reports each LNA has a minimum 'burn in' of 48 hours prior to final test and shipping; options include cable or separate DC connector powering.

RECEIVER Accessories

Microwave Filter Company (6743 Kinne St., E. Syracuse, NY 13057/315-437-3953) is offering a new '48 Hour Interference Analysis' program to TVRO dealers. Information from field observations supplied by the installing dealer is integrated with a complex computer analysis program drawing upon the known microwave service paths in the region. From that, the dealer is given a set of probable cures to employ in fixing the TI problem.

The same firm has also announced a TVRO receiver bandpass filter with a 30 MHz bandwidth centered on 130 MHz for those receivers that employ the 'unusual' frequency range as an 'IF.' The unit is the model 3771-(30) 130.

SMATV

Microdyne Corporation (P.O. Box 7312, Ocala, Fl. 32672/904-687-4633) has begun manufacture of an **addressable customer service tap** for the SMATV industry. Developed primarily for SMATV operator Domestidyne Corporation of New Orleans, an SMATV operated operated with Microdyne ownership involvement, the system will allow a pay per view or pay per day viewing status for residents of hotels or motels served by the systems. The system will be computer addressable.

OTHER

KLM Electronics (16890 Church St., Morgan Hill, Ca. 95037/408-779-7363) has opened up a new 'marketing field' by engaging the services of **Dr. Robert H. Decker.** Doctor Decker pioneered school use of TVRO systems in Mount Sterling, Il. by installing one of the first educational TVRO systems in the country. He will be responsible for expanding the KLM 'educational TVRO market' throughout the United States.

The Pleasure Channel (614-349-7715 or 319-393-0965) has signed an agreement with Channel-Entertainment International for the marketing of the new adult rated satellite delivered service. Charges per (home) TVRO user will be $100 per year plus the cost of the descrambler system. No firm date for commencement of the service has been announced.

SatcoUSA (834 Cookson Av., New Philadelphia, Oh. 44663/800-362-8619) has opened a **new warehouse** facility in Lansing, Michigan. The new warehouse will be operated to serve Michigan and area TVRO dealers with products from Sat-Tec, LOCOM, Sat-Trol, ADEC, Draco, Chaparral and other products. SatcoUSA also manufactures its own line of antennas from 6.5 feet to 16 feet in size.

VIDEOSHOW, a professional show for the professional producers of educational and industrial video products and productions, will be staged May 22-24 (1984) at the L.A. Convention Center (North Hall) by the people who create **Videoplay Magazine.** Full information on attending or displaying at the show from 203-743-2120.

CALENDAR/ Through January 1st

NOV 19-20: 'Great Lakes/Ohio Valley Satellite Technical Show and Consumer Fair.' Day one — dealer seminars on marketing, product review sessions, manufacturer speakers. Day two, open to consumers. University Hilton, Columbus, Ohio. Contact 1-800-592-1956 (in Ohio 1-800-592-1957). **First time event,** no rating.

NOV 29: 'International Association of Satellite Users' meeting. No further details available (Washington, DC) contact Donna McCaughey 703/437-5457. **No rating,** unknown event.

DEC 13-15: Western (Cable Television) Show. Second largest gathering of cable television industry each year featuring cable, satellite and STV/DBS technologies. (Anaheim, Ca.) Contact 415/881-0211. **(***)**

NEW BIRDS/ Through January 1st

RCA F2R scheduled to begin regular service November from 72 west, 24 transponders, all 8.5 watts. **Note:** Dedicated to **non-video** services.

HUGHES Galaxy II testing at 74 west, 24 transponders, all 9 watts. **Note:** Dedicated to **non-video** services.

Explanation of Rating System:

* — Event not recommended.

** — Marginal event with one or more serious flaws.

*** — **Good event, recommended if topic matter is of interest to you.**

**** — Superior event, recommended if you have any interest in satellite communications.

NEW MONTHLY INDUSTRY TELEVISION PROGRAM

Satellite Financial Planning Corporation (SFPC) will be sponsoring a monthly 'TVRO Dealer' information, satellite delivered television program, starting either late in January or early in February.

The program will be 30 minutes in length, be scheduled over the weekend period to allow maximum opportunity for dealers to view the program, and is being formatted by former **Sat-Scene** producer **George Mitchell** under a contract with SFPC. The program will include advice to dealers on marketing TVRO packages, reports on the progress of the SFPC financing and warranty program, and selected interviews with industry people. Included on the first show will be a report prepared in Sri Lanka by members of the TVRO industry who will be visiting space visionary **Arthur C. Clarke** late this month.

The thrust of the program, according to sponsor SFPC, will be to provide an 'open forum' to the home TVRO industry allowing dealers to have access to the latest marketing techniques, technical tips and industry policy makers.

Great Expectations

We've used our considerable engineering and marketing experience to design and manufacture what we think will be the best performing TVRO system the world has seen. The new Paraclipse 16 will greatly reduce the expense and complexity associated with downlink for rebroadcast systems. The Paraclipse 16 offers outstanding performance at a very manageable size and price.

The Paraclipse 16 is lighter, stronger, more accurate and less affected by weather than any commercial equipment available. The Paraclipse 16 is shippable, easily assembled and can be installed almost anywhere. Our welded aluminum rib and ring truss system forms an incredibly strong framework that will remain distortion-free under the worst conditions. It is this perfect parabolic symmetry that allows us to reduce the overall diameter of the antenna with no loss of performance.

The new Paraclipse 16 is everything you have come to expect from Paradigm Manufacturing: excellent performance at an unbeatable price.

Paraclipse
HIGH PERFORMANCE
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